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BOURNE (A. I.) & WHITCOMB (W. D.). **Department of Entomology.**—*Bull. Mass. agric. Exp. Sta.* no. 305 (Ann. Rep. 1933), pp. 28–36. Amherst, Mass., March 1934.

Work in Massachusetts during the year ending 30th November 1933 included investigations on various insecticides. Atomised oil sprays applied at considerable pressure by a special apparatus [*R.A.E.*, A **21** 474] killed a high percentage of the overwintering eggs of the red mite [? *Paratetranychus pilosus*, C. & F.]. A commercial barium fluosilicate compound used as a dust with 2 or 3 parts hydrated lime was as effective against the Mexican bean beetle [*Epilachna corrupta*, Muls.] as magnesium arsenate [**21** 417] ; it did not injure the bean plants and seemed to retard reinfestation. Sprays of nicotine sulphate (1 : 800) or a proprietary pyrethrum compound and pyrethrum or rotenone dusts were efficient in reducing the number of larvae, but allowed reinfestation to take place. Dormant treatment of *Gladiolus* corms with hydrocyanic acid gas or naphthalene prevented serious development of gladiolus thrips [*Taeniothrips gladioli*, Moult. & Stnw.] until late in the season ; of insecticides tested for use in the field, a Paris green and molasses spray was the most satisfactory [*cf.* **21** 479, etc.]. Against the onion thrips [*Thrips tabaci*, Lind.], which was more abundant than for several years, a spray of nicotine sulphate and fish-oil soap was the most effective insecticide ; the Paris green and molasses spray caused severe injury to onions. In plots treated with naphthalene flakes the damage was comparatively slight, and promising results were obtained with pyrethrum dust.

Three miscible oil sprays containing paraffin-base lubricating oils, with specific gravities of 0·86, 0·89 and 0·91 respectively and with 75–86 per cent. unsulphonatable residue, applied at a concentration of 2 and 3 per cent. oil to plum in the delayed dormant stage, killed 98–99 per cent. of the eggs of the European red mite [*Paratetranychus pilosus*] without injury to trees. Various substitutes for lime-sulphur were tried in combination with lead arsenate against scab and insects [*Cydia pomonella*, L., etc.] on apples ; of these flotation sulphur was the most efficient, giving 96·3–98·1 per cent. clean fruit. Infestation by the apple maggot [*Rhagoletis pomonella*, Walsh] was reduced in one large area from 60–100 to 5–10 per cent. when a complete spray programme was supplemented by the removal of neglected trees, and in a smaller area it averaged only 1·8 per cent. Some 60 colonies of *Macrocentrus ancylivora*, Rohw., were liberated in 8 counties against the oriental fruit moth [*Cydia molesta*, Busck] on peach and in late summer had become well established. In one county where liberations had been made in the previous year [**21** 417], the percentage parasitism was 43–88. Experiments to show the effect of temperature on the activity of the plum curculio [*Conotrachelus nenuphar*, Hbst.] verified the results of previous work [**21** 418, etc.]. There appeared to be a tendency to decreased activity above 75°F. Low temperature produced a supply of stored energy that resulted in slightly super-normal activity (as indicated by number of feeding punctures) when the temperature was [illegible]d. On the other hand, exposure to high temperatures reduced the number of feeding punctures under subsequent cooler conditions. Oviposition was similarly affected, but showed more variation. Of stomach poisons tested against the adults, calcium and manganese arsenates proved rather more toxic than lead arsenate, and barium fluosilicate and sodium aluminium fluoride were only slightly less effective. A brief account is given of the occurrence on apple of a

(706) Wt. P2821/3585 1700 9/34 S.E.R. Ltd. Gp. 353. [A]

Cecidomyiid tentatively identified as *Dasyneura mali*, Kieff. [**22** 398].

The percentages of infestation by the first and second generations of the carrot rust fly [*Psila rosae*, F.] were 3 and 32 respectively in a carrot field subjected daily to overhead irrigation during oviposition, as compared with 0 and 28 in an unirrigated field. Of dusts tested during July-September, naphthalene gave 98 per cent. uninfested carrots, soot and two dusts containing derris gave more than 90 per cent., and two containing mercury gave more than 80. Seeds treated with mercurous chloride yielded 92 per cent. uninfested carrots. *Cryptolaemus montrouzieri*, Muls., which was successfully imported by aeroplane from California, controlled mealybugs on *Gardenia* in greenhouses in 60 days in January and in 30 days in August. The optimum temperature for it was 70°F. or above; the incubation and pupal periods were four times as long at 60°F. as at 80. Fumigation of chrysanthemums with naphthalene against red spider [*Tetranychus telarius*, L.] proved ineffective and injurious to the plants. Two commercial liquid fumigants containing benzene ring products in a solvent were effective and did not become injurious at the minimum greenhouse temperature, although their efficiency was reduced below 60°F. Most plants were tolerant of these fumigants, but cucumbers were always severely injured. A spray of pyrethrum extract and soap was more effective against this mite on carnations at 60°F. than at 80, whereas the converse was the case with a selenium preparation.

WILLE (J.). **Der Zuckerrohrschädling *Anacentrinus saccharidis* Barber (Coleopt. Curcul.). Seine Massenvermehrung und die anderer Schädlinge in Peru in den Jahren 1930 bis 1931. (Beiträge zur Schädlingsfauna von Peru. VIII.)** [The Sugar-cane Pest, *A. saccharidis*. Its Mass-increase and that of other Pests in Peru in 1930–31. (Contributions to the Pest Fauna of Peru. VIII.)]—*Tropenpflanzer* **37** nos. 5–6 pp. 185–198, 233–252, 19 figs., 7 refs. Berlin, May–June 1934.

The winter (May–September) was abnormally warm and dry in Peru in 1930, and various insects were consequently more abundant than usual in the following spring and summer. Severe damage to olives was caused by the Pyralid, *Margaronia quadristigmalis*, Gn. [*cf. R.A.E.*, A **20** 462]. The Coccid, *Pinnaspis* (*Hemichionaspis*) *minor*, Mask., and the Noctuid, *Anomis luridula*, Gn. (*texana*, Riley) were abundant on cotton. Parasites of the former were scarce until the summer was advanced, but injury by *Anomis* was light owing to the larvae being attacked by *Eucelatoria australis*, Tns. This Tachinid was already numerous when they appeared, having apparently been able to breed in other Noctuids during the winter, when it was obtained from *Laphygma frugiperda*, S. & A., *Xylomyges sunia*, Gn., *X. eridania*, Cram., and *Anticarsia gemmatalis*, Hb.

In the Chicama Valley, *Diatraea saccharalis*, F., the chief pest of sugar-cane, was not particularly prevalent in 1930–1931, the conditions having apparently favoured its parasites, which include *Trichogramma minutum*, Riley, *Paratheresia claripalpis*, Wulp, and *Ipobracon rimac*, Wolcott. Severe injury was caused, however, by *Anacentrinus* (*Eumycterus*) *saccharidis*, Barber, which first attracted attention in February 1931. The egg, larva and pupa of this weevil are described, and the results of detailed observations on its biology are compared with data on *A. deplanatus*, Csy., and *A. subnudus*, Buch., in Louisiana [**20** 589].

After boring their way out of the cane-stalks, the newly emerged adults occur in numbers on the upper terminal leaves, where they obtain water from dew-drops, and on neighbouring trees and telegraph poles. They fly actively and make holes in the cane-stalks for feeding and oviposition, preferably on the upper (wax-covered) half of an internode. A female appears able to lay about 50 eggs in all. In captivity, females lived for about 2 months and males for about 6 weeks. No feeding on the leaves was ever observed. After 6–7 days the larvae hatch and bore downward just beneath the surface of the stalk. The mines are not deep like those of *Diatraea saccharalis*, and on reaching a node the larva turns sideways or backwards. One internode may contain several mines. The larval stage lasts 12–18 weeks and the pupal 3½–7, pupation occurring at the lower end of the mine. The chief adult flight periods were early April, mid-August and late December.

The larvae usually occurred in standing cane-stalks [*cf.* **20** 589], but root-stocks left after harvesting were also attacked above ground. The degree of infestation varied with the variety of cane and was particularly high in cane that ripened early owing to lack of water in the soil. The outbreak was thus due to the unusually dry weather ; it ceased when the water conditions in the Valley became normal.

KALSHOVEN [L. G. E.]. [Biology of *Xyleutes ceramicus*, Wlk.]—*Versl. Afd. Ned. Oost-Ind. Ned. ent. Ver.* **1** no. 5 pp. cxlviii–cxlix. Amsterdam, 1934.

In the Netherlands Indies, the Cossid, *Xyleutes* (*Duomitus*) *ceramicus*, Wlk., the larvae of which bore in the trunks of teak, was observed to begin oviposition soon after mating. Incubation required 11–12 days. On hatching, the larvae spin a web and later disperse. Many drop on threads and are carried by wind, and only a few of these reach teak trees that provide conditions favourable for development.

LEEFMANS [S.] [Notes on *Gauromaia dives* Pasc.]—*Versl. Afd. Ned. Oost-Ind. Ned. ent. Ver.* **1** no. 5 p. clix. Amsterdam, 1934.

The larvae and adults of the Tenebrionid, *Gauromaia dives*, Pasc., were found on manila hemp (*Musa textilis*) in Deli, Sumatra, but caused very little injury to it. The larvae chiefly occur in dead leaf-sheaths. The adults live for 6 months, and females laid up to 70 eggs. The egg stage lasted 5 days, the larval 76–110 and the pupal 9–10.

RAMAKRISHNA AYYAR (T. V.). **Insect Pests of stored agricultural Products and their Control.**—*Madras agric. J.* **22** no. 5 pp. 174–177. Coimbatore, May 1934.

Very brief notes are given on the appearance and habits of the following insects attacking stored products in South India : *Calandra oryzae*, L., and *Rhizopertha dominica*, F., in rice and other cereals ; *Tribolium castaneum*, Hbst., in rice, wheat flour, pulse powder, biscuits, bran and museum specimens ; *Sitodrepa panicea*, L., which attacks all kinds of dried vegetable products, as well as books and papers ; *Lasioderma serricorne*, F., in tobacco ; *Bruchus* spp. in pulses of all kinds ; *Sitotroga cerealella*, Ol., in cereals ; and *Corcyra cephalonica*, Stn., and *Plodia interpunctella*, Hb., in flour, dry nuts, cereals and other vegetable products. General measures for the prevention and control of infestation by these insects are outlined.

SUBRAMANIAM (T. V.). **The Coffee Stem Borer.**—*Bull. Dep. Agric. Mysore* ent. Ser. no. 11, 18 pp., 5 pls., 3 graphs, 20 refs. Bangalore, 1934.

An account is given of the bionomics of the Cerambycid, *Xylotrechus quadripes*, Chevr., which is a serious pest of coffee in districts of western Mysore where the annual rainfall is less than 100 ins. All stages are described. The degree of infestation is influenced by the north-east monsoon rains, which usually coincide with the flight period of the adults (October–November); when the rains are heavy and prolonged, oviposition is reduced, the adults being active only in bright, hot weather. When infestation is severe, the percentage loss of coffee bushes on well kept estates has varied from 2·3 to 12·5, and on neglected ones from 17·8 to 20. The average loss has been 3·1 per cent. during the last seven years in several well managed plantations in one district, but even so, a large part of the estates would eventually need replanting.

After emergence, the adult remains in the pupal chamber inside the stem for 3–7 days; it then works its way along the tunnel to the bark, where it pushes open a lid-like disk cut out by the larva. It remains close to the surface, retreating into the tunnel at the slightest disturbance; when conditions are favourable, it emerges and takes wing. Eggs laid in October–November invariably gave rise to adults in the same months in the following year. Adults have also been observed emerging in small numbers in April–May. Oviposition occurs throughout October and November, the eggs being laid in the afternoons on plants exposed to sunlight. They are deposited in small groups in cracks, or under bark or moss. One female confined with a male laid 93 eggs in 9 days and died on the 11th day, the male having died on the 5th day. Dissected females contained an average of 120 eggs. The larvae hatch after 9–15 days and bore into the bark, cutting out tortuous tunnels that cause ridges to appear. They then mine in all directions in the wood for about nine months, after which they prepare exit tunnels and pupate. No important alternative food-plants have been observed, but a few adults have been obtained from *Olea dioica*.

Natural enemies observed attacking the larvae were a bird (*Cyanops* sp.), which cuts away portions of the bark and stem and extracts them, and a Eupelmid, *Metapelma* sp. This parasite, which can only attack the young larvae, drills through the bark with its ovipositor and deposits an egg on the host. The parasite larva pupates at the end of the tunnel and the adult emerges by cutting a circular hole in the bark.

Various measures tried for control [*R.A.E.*, A **6** 74; **7** 288; **17** 111; **21** 28; **22** 43] are discussed. All trees removed owing to infestation should be burnt immediately, and plantations should always be given adequate shade.

Insect Pests and their Control.—*Agric. Gaz. N.S.W.* **45** pt. 5 pp. 255–260, 5 figs. Sydney, 1st May 1934.

Notes are given on the control of various injurious insects in New South Wales, including *Calandra oryzae*, L. (common grain weevil) [*cf. R.A.E.*, A **16** 224] and *Rhizopertha dominica*, F., in stored cereals. Wheat is best kept in tightly sealed iron or concrete stores, iron tanks or bins, where the moisture content varies only slightly and the

amount of carbon dioxide produced by the grain is often sufficient to prevent the development of infestation. Wheat for seed can be effectively protected by treatment with copper carbonate (2 oz. per bushel) before being stored in bags.

Prontaspis (*Chionaspis*) *citri*, Comst., occurs on the trunk and branches of *Citrus*, and occasionally on the leaves and fruit. The young scales appear chiefly during October–December and February–March. Infested trees can be effectively treated in the autumn with 1 gal. concentrated lime-sulphur in 9 gals. water if attack is confined to the trunk, branches and twigs. A spray of 1 gal. red or white oil in 40 gals. water may also be used, but this treatment is not recommended late in the season on account of a possible reduction of the following crop. In cases of heavy infestation, fumigation with hydrocyanic acid gas may be necessary.

GURNEY (W. B.). **Grasshopper Swarms in the Central West.**—*Agric. Gaz. N.S.W.* **45** pt. 5 p. 261. Sydney, 1st May 1934.

Injury has been caused to grasslands and crops in western New South Wales since January 1934 by *Chortoicetes terminifera*, Wlk. [*cf. R.A.E.*, A **22** 378], outbreaks of which may occur about every 5–7 years in different districts. The swarms tend to be confined to limited areas many miles apart ; a tentative estimate of their occurrence on one in every 5,000 acres over an area of 5,000 sq. miles (3,200,000 acres) represents a total infested area of 640 acres. Treatment of this area with poisoned bran bait would cost about 2*s.* 6*d.* per acre or £80 in all, and the expense would be divided among about 8,000 farmers throughout the district.

NICHOLLS (H. M.). **The Light Brown Apple Moth.**—*Tasmanian J. Agric.* N.S. **5** no. 2 pp. 68–72, 2 figs. Hobart, 1st May 1934.

Tortrix postvittana, Wlk. [*cf. R.A.E.*, A **21** 91] has become the chief pest of apples and other fruits in Tasmania within the last 5–6 years, partly owing to the clearing of the native bush and the planting as shelter belts of evergreen trees, on which it now breeds in considerable numbers in the immediate vicinity of orchards, and also to the effect on its natural enemies of the cold, wet summers and particularly of the dense smoke from bush fires that have recently occurred in the principal fruit-growing districts. The Bethylid, *Goniozus antipodum*, Westw., is probably the most numerous of its parasites, which killed 38 per cent. of the pupae in 1933. The Tortricid also attacks vegetables, flowers and native plants and is sometimes found in stored fruit. Large numbers of the larvae have been destroyed in February by removing and burning the terminal leaves of the shoots (which are the ones that they prefer to roll into shelters) but the process entails a great deal of labour. In tests in November, practically every moth (including females that had not yet oviposited) that came within range of an acetylene lamp found its way into a glass jar beneath containing cotton-wool moistened with carbon tetrachloride. Light-traps can be made very cheaply by suspending a bright light over a dish of water to which a little kerosene is added. Large numbers of moths have often been caught in bait pans used for the codling moth [*Cydia pomonella*, L.].

MÜLLER (W.). **Ueber die Pilzsymbiose holzfressender Insektenlarven.** [On the Symbiosis with Fungi of Wood-eating Insect Larvae.]—*Arch. Mikrobiol.* **5** no. 1 pp. 84–147, 31 figs., 3 pp. refs. Berlin, 1934.

This paper comprises an account of the isolation and culture of symbiotic fungi and yeasts obtained from several Cerambycids and Anobiids and from *Sirex gigas*, L.

THOMPSON (W. R.). **The Biological Control of Injurious Insects and Plants, and the Work of the Farnham House Laboratory.**—*Emp. Cott. Gr. Rev.* **11** no. 3 pp. 180–187. London, July 1934.

The author points out the value of the biological control of injurious insects where the employment of other measures would increase the cost of production of the crop concerned. Cases are cited in which the severity of infestation by an introduced pest has rendered necessary the introduction of its natural enemies from its place of origin. In this connection the Parasite Laboratory of the Imperial Institute of Entomology was founded in 1927 [*R.A.E.*, A **18** 518], since when about 40 pests have been dealt with on behalf of various Governments in the British Empire and over 300 shipments of beneficial insects, comprising more than 2½ million individuals, have been sent to different parts of the Empire. The procedure adopted in obtaining parasites is illustrated by brief accounts of the collection of *Collyria calcitrator*, Grav., a parasite of the wheat-stem sawfly [*Cephus pygmaeus*, L.] in England for introduction against an allied species [*C. cinctus*, Nort.] in Canada [**20** 96], and of the rearing of large numbers of a parasite [*Apanteles glomeratus*, L.] prior to their export for use against the cabbage white butterfly [*Pieris rapae*, L.] in New Zealand [**22** 38]. Examples are given of successful introductions [**21** 614 ; **22** 224, 314].

MANSOUR (K.) & MANSOUR-BEK (J. J.). **On the Digestion of Wood by Insects.**—*J. exp. Biol.* **11** no. 3 pp. 243–256, 1 fig., 38 refs. London, July 1934.

The following is substantially the authors' summary : The true wood-feeding insects do not depend on micro-organisms for the digestion of wood. They comprise those without cellulose-breaking enzymes, which derive the necessary carbohydrates from the soluble sugars and starch in the wood on which they feed, and those with such enzymes, which can utilise the cellulose of the wood through the activity of their own secretions and can therefore live on woods relatively poor in the simpler carbohydrates. Insects such as termites and Lamellicorn larvae with free-living intestinal micro-organisms use these directly as food, not as aids in the digestion of wood.

BARNES (H. F.). **Some Biological and Economic Aspects of the Gall Midges.**—*Sci. Progr.* **29** no. 113 pp. 73–86, 20 refs. London, July 1934.

Brief general notes are given, with reference to the literature, on the biology of the Cecidomyiids, including their relation to natural enemies and food-plants, and on their importance as pests and as beneficial insects. The measures practised for their control are reviewed, cultural ones being considered of particular value.

NORRIS (M. J.). **Contributions towards the Study of Insect Fertility.—III. Adult Nutrition, Fecundity, and Longevity in the Genus *Ephestia* (Lepidoptera, Phycitidae).**—*Proc. zool. Soc. Lond.* **1934** pt. 2 pp. 333–360, 40 refs. London, July 1934.

The following is the author's summary of this paper, which is one of a series [*cf. R.A.E.*, A **22** 159]:—Experiments are described which show that the number of eggs laid by, and the longevity of, *Ephestia cautella*, Wlk., and *E. elutella*, Hb., are about halved if they are deprived of drinking water, but that *E. kühniella*, Zell., is only slightly affected by it. It was also found that sugar-feeding further increased the longevity of *E. kühniella* and *E. cautella*, but did not increase the fecundity any more than water. When *E. cautella* was fed on albumen and water it lived no longer and laid no more eggs than when fed on water alone. Chemical tests showed that the enzyme invertase is present in the gut of both *E. cautella* and *E. kühniella*. A summary of the literature concerning these questions in insects in general and more particularly in the Lepidoptera shows that, whereas a sugar diet suffices to maintain life, most adult insects require proteins of some kind for the normal development of their genital products, and in many insects oviposition is entirely conditional upon the taking of such food. The adult Lepidoptera Heteroneura have, as far as is known, completely lost the need for nitrogenous foodstuffs owing to a series of modifications by which their requirements have come to be met by the food stored in the fat-body. A table shows the evolutionary trends which have finally brought about such complete liberation from the need of food that, in the final stage, the mouth-parts are reduced and no food at all is taken. The various characters involved in these trends do not appear to have been modified simultaneously (*e.g.*, enzymes may persist after the need for them has been lost).

CRANFIELD (H. T.), ROEBUCK (A.) & STAFFORD (J. G. W.). **The Control of Mites in Cheese Stores.**—*J. Minist. Agric.* **41** no. 4 pp. 347–352, 2 refs. London, July 1934.

Of the mites that attack cheese in England [*R.A.E.*, A **5** 516], *Tyroglyphus dimidiatus*, Herm. (*longior*, Gerv.) is the most prevalent in the Midlands, Stilton and Wensleydale cheeses being more susceptible to infestation by it than hard-pressed cheeses. In 1930, highly satisfactory control was obtained by fumigating an infested store with carbon bisulphide. Of various materials tested with a view to finding a less dangerous fumigant, 9 were found to kill the mites in half an hour. Of these, however, only ammonia had no adverse effect on the cheese. Large-scale trials in 1931 and 1933 showed that ammonia gas at a concentration of 1 : 25 in a reasonably airtight storeroom effectively destroys the mites in less than 12 hours. Kills of over 90 per cent. have been obtained under commercial conditions. The gas compressed in cylinders appears to be the most convenient for this purpose. As it does not kill the eggs, it is necessary to fumigate periodically to prevent serious injury. If the cheeses were fumigated close together in a special room so that the air space was reduced, it would be advisable to lower the concentration of the ammonia to 1 : 35 or even 1 : 40. Hard-pressed cheeses should not be fumigated,

as after fumigation the bandages round them give off an unpleasant acrid odour apparently caused by butyric acid, traces of which occur in the cheese coat.

KEARNS (H. G. H.), MARSH (R. W.) & SWARBRICK (T.). **Further Observations on the joint Control of the Apple Sawfly and Apple Scab.—Season 1933.**—*Rep. agric. hort. Res. Sta. Bristol 1933* pp. 60–65, 1 fldg. table, 5 refs. [Bristol, 1934.]

In further experiments in the control of the apple sawfly [*Hoplocampa testudinea*, Klug] at Long Ashton, apple trees were sprayed on 24th May 1933 (7 days after petal-fall), when 40 per cent. of the eggs had hatched and some larval galleries were evident on fruitlets, infestation being highest on the upper part of the trees. Nicotine (8 fl. oz. to 100 gals. water, with 2½ lb. Agral I) only reduced the percentage of infested fruits (as estimated at the end of June) from 53·9 to 21·4, which is considered inferior to results obtained with this spray in previous years [*cf. R.A.E.*, A **20** 550; **21** 557]. The addition of 1½ gals. lime-sulphur (against apple scab) did not reduce the toxicity of the nicotine, and the further addition of 2 lb. lead arsenate decreased infestation to 8·06 per cent. Lead arsenate used with a lime-sulphur wash should not be ground to more than 300-mesh fineness.

Recommendations based on these results have already been noticed [**22** 425].

Entomological Investigations.—*Rep. exp. Res. Sta. Cheshunt* **19** (1933) pp. 69–78. Cheshunt, Herts, 1934.

According to E. R. Speyer (pp. 69–75), sprays containing rotenone sometimes killed the eggs and resting stages of *Tetranychus telarius*, L., on arum and tomato in experiments carried out in greenhouses in England during 1933, but their action was too variable for them to be of value in commercial nurseries. Practical control of the mite can only be obtained with a spray that contains an ovicide or retains its toxicity on the foliage for at least 4 days. During summer, at least half the population are in the egg-stage, which lasts about 6 days. Some mites were killed by a dust containing methyl salicylate, but the vapour liberated affected the young foliage of tomato. The maintenance of a high temperature and a saturated atmosphere was shown to be of no practical value in control, though mites were killed experimentally by exposure for 2 hours to 120°F. in saturated air. Since its discovery in October 1925 [*R.A.E.*, A **14** 344], the predacious Cecidomyiid, *Therodiplosis persicae*, Kieff., has become more prevalent and of earlier seasonal occurrence. The larvae are thought to have checked infestations of the mite on tomatos and peaches grown under glass.

The addition of rape oil has increased the adhesive properties of synthetic cryolite used as a substitute late in the season for lead arsenate against *Polia oleracea*, L., in tomato houses [*cf.* **19** 639]. Tomatos in the field artificially infested with larvae of this Noctuid were sprayed during May with various mixtures containing cryolite and at the beginning of July (when only a few larvae were found and fresh introductions were made) with the best of the formulae. This consisted of ½ lb. fine cryolite stirred into 4 fl. oz. water to which 2 fl. oz. rape oil was gradually added, the resulting paste being diluted at the rate of 2 oz. to 1 gal. water. At the end of July and the beginning of

August, the foliage was not scorched and had scarcely been attacked, and the plants each yielded over 1 lb. good fruit, of which less than 1 per cent. bore feeding marks. Wiping, however, was necessary to remove the deposit of cryolite. Treated foliage is apparently repellent to the larvae, which usually die of starvation, though the very hungry ones may consume sufficient quantities to be lethal. It is probably inadvisable to spray tomatos under which lettuces are growing unless these are well washed before marketing. The Eulophid, *Comedo opaculus*, Thoms., was first observed parasitising the larvae on 19th July. Three generations were reared up to the beginning of November, the winter being passed largely in the pupal stage on the leaves or stems near the dead host. Its economic value is doubtful, as the males predominate towards the end of the growing season, when the caterpillars are most numerous, and the females, which lay all their eggs on one host, select the older larvae, even though they may be already parasitised, and oviposit as readily on larvae of *Barathra* (*Mamestra*) *brassicae*, L., or *Brotolomia* (*Phlogophora*) *meticulosa*, L., both of which occur in or near glasshouses, the latter on chrysanthemum. In an attempt to breed the Eulophid through the winter on *B. meticulosa*, the host larvae discarded the eggs, which were laid on them in December, during moulting and pupated normally. About 50 adults of *Pimpla instigator*, F., emerged from 200 pupae of *Polia* collected at random in tomato houses in October and were kept alive until December.

Thrips tabaci, Lind., seldom breeds on tomato, but the adults often enter the houses, to which they may introduce the virus disease, spotted wilt [*cf.* **19** 498]. Weeds should be cleared from the vicinity of houses in which the presence of this thrips is suspected, the soil in them should be steamed during the winter, and the growing of *Cineraria*, *Dahlia*, nasturtium, potatoes or onions should be strictly avoided. The thrips hibernate in the ground and may feed on the foliage of potted tomato plants and young plants in the soil early in the season. Promising results have been obtained on arum and cyclamen with a dust containing 4 per cent. nicotine and equal quantities of naphthalene and magnesium hydrate. This latter was less injurious to the flowers than lime, but the dust was ineffective on carnations, doubtless owing to the concealed positions of the thrips. It was also ineffective on cucumber against *T. fuscipennis*, Hal. (rose thrips). In the field, the latter appears to feed chiefly on the flowers of buttercups [*Ranunculus*].

Blaniulus guttulatus, Bosc, often infests the soil of tomato houses and of pots containing chrysanthemums. Naphthalene mixed into the soil at the rate of 1 : 500 parts by weight gave complete mortality after 4 days, but did not affect millepedes introduced after this period ; when broadcast over the soil and watered in at the rate of 4 oz. per sq. yd., it killed all the millepedes to a depth of 3 ins. in 4 days, but only 50 per cent. of those between 3 and 5 ins. It is thus estimated that, to reduce the numbers materially, at least 6 oz. naphthalene per sq. yd. should be dug into the soil and probably 8 oz. in heavy soils.

O. B. Orchard (pp. 76-77) gives a short account of an unsuccessful attempt to attract wireworms to poison baits and states that good results may be obtained in the control of severe infestations of *Tetranychus telarius* and fungi on tomatos and cucumbers with an emulsion of 1 gal. oil to 100 gals. water with the addition of ½ oz. of a colloidal copper compound to 1 gal. spray. The mixture causes no injury to plants and obviates the necessity of two separate sprays.

Hanna (A. D.). **The Male and Female Genitalia and the Biology of *Euchalcidia caryobori* Hanna (Hymenoptera, Chalcidinae).**—*Trans. R. ent. Soc. Lond.* **82** pt. 1 pp. 107–136, 38 figs., 12 refs. London, 30th June 1934.

The immature stages are described of *Euchalcidia caryobori*, Hanna, a Chalcid found parasitising *Pachymerus* (*Caryoborus*) *pallidus*, Ol., in Sudanese senna (*Cassia* sp.) in the London docks [*R.A.E.*, A **22** 273], with an account of the larval anatomy and the genitalia of the adults of both sexes.

The eggs of the host are laid on the surface of the pods and hatch in 6–7 days. Each larva eats its way into a seed, the entire contents of which it consumes. After an average of 20 days, it spins a cocoon, usually on the surface of the pod, and then pupates, the life-cycle occupying an average of 52 days. During the process of artificial rearing, in which eggs from pods were transferred to individual seeds, it was necessary to gum the egg to the seed to induce the larvae to penetrate directly into it. This also resulted in the pupae being free from infestation by *Pediculoides ventricosus*, Newp., which destroyed the eggs of both host and parasite. After an average pre-oviposition period of 3 days, the female of the Chalcid deposits an average of 102 eggs on pupae of the Bruchid; sometimes as many as 10 eggs are laid on one host, but only one adult usually emerges. The larva feeds externally on the pupa of the host and pupates in its cocoon. At 27°C. [80·6°F.], the egg-stage lasts an average of 2 days, the larval 8 for the males and 10 for the females, and the pupal 9; emergence from the host cocoon takes about 4 days, the average adult life being 50 days. The progeny of fertilised females consisted of both sexes in equal numbers, and that of unfertilised ones of males only.

Ward (K. M.). **The Green Peach Aphid (*Myzus persicae* Sulzer) in Relation to the Peach in Victoria and the Measures investigated for its Control.**—*J. Dep. Agric. Vict.* **32** pts. 2, 3 & 5 pp. 97–104, 134–145, 258–268, 13 figs., 5 graphs, 2 diagr., 5 refs. Melbourne, February, March & May 1934.

Extensive investigations were undertaken during 1930–33 in two localities in Victoria on *Myzus persicae*, Sulz., attacking peach and nectarine. This Aphid is sufficiently injurious to warrant annual control measures in some orchards, and general outbreaks of it occur every 3–4 years or more that considerably reduce the crops of fruit. An account is given of its seasonal history as observed in the field and of metamorphosis and reproduction in spring and autumn in the insectary. The various forms are described.

In Victoria, spring infestation of peach and nectarine is derived solely from the eggs, which are deposited on the trees in May and the first half of June and hatch between about 28th June and 23rd August. The stem-mothers develop on the unopened buds, and their progeny attack the blossoms, unfolding leaf-buds and young fruits, and later the young leaves, interfering with their development, distorting the twigs and reducing the future bearing capacity of the tree. Winged forms that migrate to weeds arise in the third and subsequent generations, chiefly owing to the change in the condition of the food-plant, the period of migration lasting from late October to early December. The Aphids continue to reproduce on weeds until late April or May, when winged males and sexuparae return to peach, the latter giving

rise to the sexual oviparous females. These autumn forms usually feed on the upper surface of the old leaves, and do not appear to cause any damage. Larvae that hatch before mid-winter are apparently capable of surviving on the dormant buds.

The parasites observed were the Braconid, *Aphidius persicae*, Frogg., which was the commonest, attacking the parthenogenetic and oviparous females and being active from mid-September to May, the Cynipids, *Charips* (*Allotria*) *aphidae*, Frogg., and *Alloxysta* sp., and the Calliceratid, *Lygocerus niger*, How. *Chrysopa ramburi*, Schneider, and *Syrphus viridiceps*, Macq., preyed on the Aphids throughout the spring, summer and autumn, and the Coccinellids, *Coccinella repanda* var. *transversalis*, F., and *Leis conformis*, Boisd., which become numerous in late spring, frequently caused marked reductions in infestation during October–November. Adults of *L. conformis* were parasitised by a Braconid, and larvae of *S. viridiceps* by the Ichneumonid, *Bassus laetatorius*, F.

An account is given of spraying tests, some of which have already been noticed [*R.A.E.*, A **21** 480]. They showed that control may be obtained by one application of an efficient ovicide early in July. A tar distillate was the most effective spray, but lime-sulphur was also highly toxic to the eggs and was superior to red oil.

HENDERSON (M. R.). **The Sources of "Tuba" in the Malay Peninsula.** —*Malayan agric. J.* **22** no. 3 pp. 125–130, 2 pls. Kuala Lumpur, March 1934.

Tuba Root (*Derris* **spp.**).—*Agric. Leafl. Dep. Agric. S.S. & F.M.S.* no. 1, 3 pp., 13 refs. Kuala Lumpur [1934].

The first paper contains descriptions of the foliage and habit of growth of *Derris malaccensis* var. *sarawakensis* (Sarawak erect) [*cf. R.A.E.*, A **21** 26], which is the cultivated variety of this species, and several races of *D. elliptica*, with a key. The second consists of a brief account of the methods practised in Malaya of cultivating, harvesting and preparing the roots of these plants, of which *D. elliptica* is more generally grown, *D. malaccensis* var. *sarawakensis*, having a lower rotenone content [*cf.* **21** 617, etc.]. The roots must be baled immediately after drying to avoid damage by boring beetles [*cf.* **21** 677; etc.].

COMMUN (R. L.). **Deux parasites du riz dans le Sud-Indochinois: la pyrale jaune à 2 points et la pyrale rouillée**—*Bull. écon. Indochine* **37** pp. 334–339. Hanoi, 1934.

Severe injury is caused to rice in southern Indo-China by *Schoenobius bipunctifer*, Wlk. (*incertellus*, Wlk.) and *Chilo suppressalis*, Wlk. [with which *C. simplex*, Butl., is possibly identical]. The larvae and adults of these two Pyralids are briefly described. The eggs are laid on the leaves at night, those of *Schoenobius* in masses covered with hairs from the abdomen of the female and those of *Chilo* in regular double rows. The larvae hatch in a week and immediately make their way along the leaf to the stem, where they bore into the young succulent parts. The larvae of *S. bipunctifer* occur singly, whereas several of *C. suppressalis* may inhabit the same stalk [*cf. R.A.E.*, A **8** 451; **18** 35]. After several days, the larvae of the former species construct shelters from pieces of leaves and then migrate and enter other stalks, to which the shelters remain attached obliquely. The larvae of both species pupate

near the base of the hollowed stem ; the larval and pupal stages of *Chilo* last about 25 and 10 days, and the pupal stage of *Schoenobius* at least a week.

Light-traps may be employed against the adults of *S. bipunctifer* before oviposition, but they tend to attract them from surrounding fields and consequently concentrate infestation. To destroy the larvae, the rice should be reaped as close to the soil as possible, and stubble and débris should be disposed of by burning, ploughing, etc. During the off season, spontaneous vegetation in and near the fields should be cut down ; if this cannot be done everywhere, plants near future seedling beds should be cleared to prevent invasion by *Spodoptera mauritia*, Boisd. [*cf.* **22** 124] and *Nymphula*.

TSAI (Pang-hwa). **A Prediction on the Outbreak of the Paddy Borer in 1934.** [*In Chinese.*]—*Ent. & Phytopath.* **2** no. 17 pp. 320–323, 2 graphs. Hangchow, 11th June 1934. (With a Summary in English.)

Observations have shown that a hot rainy autumn and a warm dry winter are important factors promoting outbreaks of the rice-borers, *Schoenobius bipunctifer*, Wlk. (*incertellus*, Wlk.), *Chilo simplex*, Butl., and *Sesamia inferens*, Wlk. [*cf. R.A.E.*, A **21** 179]. The occurrence of such conditions in 1927 resulted in a severe infestation of rice in Chekiang Province in 1928 and 1929. Investigations in Nanking in the spring of 1934 showed that 45·88 per cent. of the stubble was infested, chiefly by *S. bipunctifer*, and that the winter mortality of the larvae had only averaged 34·8 per cent. These figures and the weather of the preceding autumn and winter indicate that an outbreak almost as severe as that of 1928 may be expected ; this would involve a loss of 30–40 per cent. of the crop.

TSAI (Pang-hwa). **Experimentelle Untersuchungen über den Einfluss der Temperatur und Luftfeuchtigkeit auf die Eiablage der** *Calandra granaria*. [Experimental Investigations on the Effect of Temperature and Air Humidity on the Oviposition of *C. granaria*.] [*In German and Chinese.*]—*Agric. sinica*, **1** no. 1 pp. 1–34, 9 figs., 13 refs. Nanking, 1934. (Abstr. in German and Chinese in *Ent. & Phytopath.* **2** no. 17 pp. 331–333. Hangchow, 11th June 1934).

In investigations in China, the development of *Calandra granaria*, L., was slowest at temperatures below 13°C. [55·4°F.] and high atmospheric humidity, and most rapid at 24–27°C. [75·2–80·6°F.] [*cf. R.A.E.*, A **15** 373] and a relative humidity of 95–100 per cent. The vital optimum was 16–22°C. [60·8–71·6°F.] and 85–100 per cent. humidity. The increase of the weevil in granaries is therefore more dependent on humidity than on temperature. No eggs were laid above 35°C. [95°F.] or below 13°C. Humidity below 75 per cent. was unfavourable to oviposition, 85–95 per cent. was the optimum, and at 100 per cent. it was completed in an abnormally short time. At a constant humidity of 100 per cent. and high temperature, the eggs were destroyed by fungi.

Female weevils laid 1,970 eggs in wheat and 479 in barley. The barley, however, had not been husked, whereas the wheat had. The ratio of females to males was about 2 : 1.

Lieu (K. O. Victoria). **Miscellaneous Notes on some Insects studied for Interest. I. An Apricot Pest and its Parasite. (An Eucleid and a Tachinid.)**—*Ent. & Phytopath.* **2** no. 16 pp. 294–299, 1 fig. Hangchow, 1st June 1934.

Of 61 larvae of a Limacodid collected on an apricot tree in Peking on 18th July 1931, 55 were parasitised externally by 1–4 eggs of a Tachinid. The larva, cocoon and adults of the moth are briefly described, with notes on the construction of the cocoon. The moths, which emerged in the first week of August, did not pair in the jars in which they were reared, and no eggs were found. The parasites emerged in mid-August, not more than one from a single host cocoon, and lived 3–7 days.

Ma (Tsing-chao). **Notes on the Trip to Chuchow with special Reference to a *Cryptomeria* Lasiocampid.** [*In Chinese.*]—*Ent. & Phytopath.* **2** no. 16 pp. 299–306, 2 figs. Hangchow, 1st June 1934. (With a Summary in English.)

During 1931–33, *Cryptomeria japonica*, a valuable timber tree, was seriously damaged in Chuchow and its vicinity, owing to destruction of the foliage by a Lasiocampid, (?) *Dendrolimus* sp. This moth, the larva and pupa of which are briefly described, is recorded from ten districts in southern Chekiang. The pupae, of which 60 per cent. are parasitised by Chalcidoids, are present during August or September, and hibernation probably occurs in the egg stage. The cultivation of mixed stands is the most effective control measure.

Harukawa (C.), Takato (R.) & Kumashiro (S.). **Studies on the Seed-corn Maggot. IV.**—*Ber. Ōhara Inst. landw. Forsch.* **6** no. 2 pp. 219–253, 4 graphs, 8 refs. Kurashiki, 1934.

A list is given of numerous plants, dried plant substances, animal substances, etc., that were found in further studies in Japan [*cf. R.A.E.*, A **22** 236, etc.] to serve as food for the larvae of *Phorbia* (*Hylemyia*) *cilicrura*, Rond.

In summer, the longevity of the adults varied from 2 to 40 days; in winter, it was at least 12 days and sometimes as long as 120. The pre-oviposition period [*cf.* **18** 676] was 20–60 days in December–January and from 5–6 to 16–17 in May–June.

At temperatures between 10 and 30°C. [50–86°F.], nearly all the eggs hatched; at 35°C. [95°F.], about 70 per cent. died. About 90 per cent. of the larvae and pupae developed successfully at a constant temperature of 12°C. [53·6°F.], and at 33°C. [91·4°F.] about 80 per cent. of the larvae pupated. Larvae reared at a constant temperature of 35°C. all died. At 33°C. only about 40 per cent. of the pupae developed successfully, and all died at 35°C. The egg and larval stages lasted approximately 8 and 30 days, respectively, at 10°C., and 1 and 5 days at 30°C. for the autumn generation. The pupal period was about 50 days at 10°C. and about 7 at 33°C. At 10 or 12°C., the pupae sometimes entered a dormant period of varying duration. The life-cycle from oviposition to adult emergence was about 85 days at 10°C., 24 or 25 at 20°C. [68°F.] and 16 or 17 at 25°C. [77°F.]. Including the pre-oviposition period, it was about 14 weeks in winter and 3 weeks in early summer.

The larvae and pupae did not develop well in a very dry soil, but variations in the moisture content above 20 per cent. of saturation had little effect on mortality or rate of development.

[Rekach (V. N.).] **Рекач (В. Н.). The Problem of protecting Cotton from Pests and Diseases in ZSFSR (Transcaucasian Republics) during the second Five Year Plan.** [*In Russian.*]—*Trud. Zakavk. nauch.-issled. khlopk. Inst.* [*Trans. Transcaucas. Cott. sci. Res. Inst.*], no. 43 pp. 373–428, 5 figs., 10 graphs (2 fldg.), 1 ref. Tiflis, 1933. [Recd. July 1934.]

About 65 species of insects and mites have been recorded from Transcaucasia as damaging cotton, of which the more injurious have already been noticed [*R.A.E.*, A **19** 160; **20** 345, 349, 391; **21** 576; **22** 56]. Less important pests that occasionally occur in numbers include *Thrips tabaci*, Lind., and other Thysanoptera, *Gryllotalpa gryllotalpa*, L., and the locusts, *Calliptamus italicus*, L., and *Locusta migratoria*, L., which are less frequent than *Dociostaurus maroccanus*, Thnbg. [*cf.* **20** 391]. *Platyedra* (*Gelechia*) *malvella*, Hb., which feeds on the buds, ovaries and bolls, only occurs in the Nakhichevan Republic, where in 1931 it caused a loss of 16·7 per cent. of the crop. Experiments have shown that 90–95 per cent. control may be obtained by dusting with Paris green or sodium fluosilicate.

The economic importance of these pests is briefly discussed, and tables are given showing the areas infested in 1932 and those that have been treated. The advantages of aeroplanes or power dusters for applying insecticides are emphasised, and the measures that should be undertaken are briefly reviewed. Against *Tetranychus telarius*, L. (*Epitetranychus althaeae*, v. Hanst.), the addition of talc to sulphur dust (2:1), by increasing adhesiveness, made it possible to halve the quantity of sulphur applied. Sulphur is not effective at temperatures below 30°C. [86°F.]. Dusting should be started during the first half of July (when infestation is about 5–10 per cent.) and repeated at intervals of 15 days, usually till September. A spray of lime-sulphur (1 : 60) at the rate of 50–140 gals. to the acre proved a cheap substitute for the dust, and if carefully applied, killed 85–90 per cent. of the mites, as compared with a maximum of 60 per cent. killed by the dust, besides destroying about 40 per cent. of the eggs, which are not affected by the latter.

Attention is drawn to the need for measures against pests of leguminous fodder crops, including *Hypera* (*Phytonomus*) *variabilis*, Hbst., which often destroys the whole first crop of lucerne, and *Macrosiphum onobrychis* (*Acyrthosiphum pisi*) var. *turanicum*, Mordv., which annually causes severe damage to autumn-sown peas.

Husain (M. A.), Haroon Khan (M.) & Ganda Ram. **Studies on *Platyedra gossypiella* Saunders, the Pink Bollworm of Cotton, in the Punjab. Part III. Phototropic Response of *P. gossypiella*.**—*Indian J. agric. Sci.* **4** pt. ii pp. 261–289, 4 graphs, 16 refs. Delhi, April 1934.

The following is almost entirely taken from the authors' summary of further observations [*cf. R.A.E.*, A **20** 398] on *Platyedra gossypiella*, Saund., in the Punjab, in which the moths were caught in a light-trap kept in operation nightly from mid-July to the first week in November during 1929–31. The source of light was an incandescent gas lamp of

200 candle power. During the three years, 9,458 moths were caught, the maximum numbers being trapped between mid-September and mid-October. Four-hourly collections on certain nights showed that they were attracted throughout the night, the time of maximum attraction [*cf.* **16** 605; **19** 188] varying with the season. Phototropic response was directly dependent on temperature, the most favourable zone being 76–87°F. Larger numbers were collected on nights following days on which cotton had been picked. Moonlight decreased the catch. Males were attracted in slightly larger numbers than females, but most of the latter were gravid. Examination of the number of larvae in green bolls showed that the light-trap increased infestation in the field rather than reduced it, because moths were attracted from surrounding fields.

Wilkinson (D. S.). **On some *Apanteles* (Hym., Bracon.).**—*Stylops* **3** pt. 7 pp. 145–156. London, 14th July 1934.

The new species described from known hosts are: *Apanteles thoseae*, from the Limacodid, *Thosea cruda*, Wlk., in Sumatra; and *A. cacao*, from *Lymantria ampla*, Wlk., on cacao, and *A. nepitae*, from the Arctiid, *Asura* (*Nepita*) *conferta*, Wlk., both in Ceylon. A key is given to the species of a newly erected group of *Apanteles*, supplementing that in a previous publication [*R.A.E.*, A **21** 135]. Host records include the following: *A. laxatus*, Wlkn., from *Porthesia producta*, Wlk., in Uganda; *A. ugandaensis*, Gah. [**7** 105], from *Tortrix* (*Cacoecia*) *occidentalis*, Wlk., in Kenya; *A. africanus*, Cam., probably from *Porthesia dewitzi*, Grünb., in Uganda, where this is the commonest Lymantriid on cotton; *A. paludicolae*, Cam., from a Pterophorid, probably *Marasmarcha crepuscularis*, Meyr., on *Cajanus indicus* in Uganda; *A. bordagei*, Giard [*cf.* **2** 216], which is re-described, from *Leucoptera coffeella*, Guér., on coffee in Kenya and Tanganyika; *A. carpatus*, Say [*cf.* **3** 509], from *Tineola biselliella*, Humm., in Switzerland; *A. expulsus*, Turner, from *Amyna punctum*, F., on *Croton tiglium* in Ceylon; *A. galleriae*, Wlkn. [**20** 386], from *Galleria mellonella*, L., in Mauritius; and *A. angustibasis*, Gah. [**13** 432], from *Cnaphalocrocis medinalis*, Gn., in Malaya.

Green (E. E.). **Note on a "Mealybug" wrongly attributed to *Pseudococcus bromeliae*, Bouché.**—*Stylops* **3** pt. 7 p. 162, 1 ref. London, 14th July 1934.

Pseudococcus cannae, n. n., is proposed for a mealybug attacking the roots of *Canna* and *Impatiens* in Ceylon, which was described by the author in a work already noticed [*R.A.E.*, A **10** 541] under the name *P. bromeliae*, Bch., which has since been found to be invalid [**10** 604]. The true *P. brevipes*, Ckll. (*bromeliae*, auct.) has been found on pineapple in Ceylon.

Conference of Governors of British East African Territories. Research Conferences. Conference on Co-ordination of Agricultural Research and Plant Protection, held at Amani Research Station, 12th to 15th February, 1934.—Med. 8vo, 56 pp. Nairobi, 1934.

This report of a conference of agricultural research workers from Uganda, Tanganyika Territory and Kenya Colony includes co-ordinated programmes of projected investigations, many of them

entomological, chiefly of problems connected with coffee, and drafts and discussions of proposed legislation dealing with plant protection, especially the regulation of plant imports. It was recommended by a special committee that steps should be taken to collect information as to the working in other tropical countries of legislation regulating the sale of insecticides, etc., with a view to drafting proposals that would be simple and effective without involving too much expenditure of analysts' time.

GARDNER (J. C. M.). **On Some Coleopterous Larvae from Uganda.**—*Bull. ent. Res.* **25** pt. 2 pp. 149–153, 1 pl., 1 fig., 4 refs. London, July 1934.

Descriptions are given of the larvae of the following Coleoptera from Uganda: the Lymexylonid, *Atractocerus brevicornis*, L., from timber; the Eumolpid, *Syagrus calcaratus*, F., from the roots of cotton; the Lamiids, *Dirphya* (*Nitocris*) *princeps*, Jordan, and *Bixadus sierricola*, White, from the stems of coffee; the Anthribid, *Zygaenodes monstrosus*, Pasc., from cotton seed (old bolls); and the Curculionid, *Alcides leucogrammus*, Erichs., from a gall in the stem of a cowpea (*Vigna*) [*cf. R.A.E.*, A **9** 19]. The larvae of *Anthores leuconotus*, Pasc., are described from coffee in Nyasaland; this Lamiid has been recorded from Uganda, but apparently not as a coffee pest.

KRISHNA AYYAR (P. N.). **A very destructive Pest of Stored Products in South India,** *Corcyra cephalonica*, **Staint. (Lep.).**—*Bull. ent. Res.* **25** pt. 2 pp. 155–169, 1 pl., 6 figs., 15 refs. London, July 1934.

Corcyra cephalonica, Stn., all stages of which are described, has recently become the most abundant and destructive of the various Lepidopterous pests of stored products in southern India, causing particularly severe damage in 1932. Its foods include the seeds of leguminous plants, cotton and cereals, particularly *Sorghum*. The adults do not fly readily and do not appear to feed; they pair soon after emergence and live only a comparatively short time. The females deposit an average of about 150 eggs each (over a period of 5 days) singly on the food materials or on rough surfaces in the stores. The larvae, which hatch in an average of 5 days, wander long distances in search of food and begin to feed under a silken shelter almost immediately, though they are able to live 1–2 days without food. The larval period (in *Sorghum*) normally occupied 46–56 days, with a maximum of 111. Some mortality may occur in the first three instars, during which broken grains are preferred to complete ones. The larvae spin whitish cocoons covered with débris, often in clusters; the prepupal period lasts 1–2 days, and the pupal averages about 12. The length of the life-cycle on different foods is recorded. On *Sorghum*, four generations occurred from November 1932 to July 1933; they were completed respectively in mid-January, the third week in March, the third week in May and mid-July, occupying an average of 59 days. They overlap considerably as the season advances. Large numbers of adults emerge during June–August, the maximum number appearing about November and the minimum from February to the end of May. This Pyralid is parasitised in fairly large numbers by *Microbracon* (*Habrobracon*) *hebetor*, Say, and the Chalcid, *Antrocephalus mahensis*, Masi. The latter has not previously

been recorded from it, but appears to be of considerable value in its control; the adult emerges from the host cocoon.

Much of the infestation could be prevented by cleanliness in stores, quick handling of material, periodical exposure of stored products to the sun, and the clearing of the previous season's crop, together with the thorough cleaning of the store-rooms before the introduction of the new material. The moths were not attracted by cold tea left in shallow pans overnight [*cf.* **17** 268]. Carbon bisulphide and hydrocyanic acid gas are considered to be the most satisfactory fumigants, though they are reported to have failed to control the eggs. In tests, carbon bisulphide appeared to give better results than calcium cyanide dust, ethylene oxide or a mixture of ethylene dichloride and carbon tetrachloride when freshly laid eggs were exposed to each fumigant for 24 hours in large jars. At 4, 8 and 12 lb. per 1,000 cu. ft., it caused 78, 92 and 95 per cent. mortality.

BUXTON (P. A.) & MELLANBY (K.). **The Measurement and Control of Humidity.**—*Bull. ent. Res.* **25** pt. 2 pp. 171–175, 2 figs., 6 refs. London, July 1934.

Descriptions are given of a number of modifications that have been found to render easier the practice of previously described methods of measuring and controlling humidity [*R.A.E.*, A **19** 712].

HODSON (W. E. H.). **The Bionomics of the Bulb-scale Mite,** *Tarsonemus approximatus*, **Banks, var.** *narcissi*, **Ewing.**—*Bull. ent. Res.* **25** pt. 2 pp. 177–185, 2 pls., 9 refs. London, July 1934.

Tarsonemus approximatus var. *narcissi*, Ewing [*cf. R.A.E.*, A **21** 112, 366; **22** 427], the egg, larva and adult of which are briefly described, is now a comparatively serious pest of narcissus bulbs in many localities in Britain, where its depredations have apparently been attributed in the past to other causes. In an appendix, W. C. Moore cites a record of *Tarsonemus* sp. (probably this variety) on narcissus in England about 40 years ago. The mite also occurs in the United States [**17** 454, etc.], Holland and Guernsey.

A study showed that reproduction (which is apparently sometimes parthenogenetic) and feeding continue throughout the year. In the laboratory during February–April at temperatures varying between about 45 and 65°F. the life-cycle from egg to adult lasted about 50 days, but it may possibly decrease to 10–12 days at higher temperatures and increase to 3 months or more in the soil in winter and spring. In the field, the mites are congregated round the neck of the bulb at the end of July, but with the shrinkage of the bulb and the formation of air-pockets in August and September they work down between the fleshy scale-leaves, causing streaks and the development of callus. The population remains comparatively small and by October consists mostly of females. With the beginning of root action, the bulbs become turgid, and large numbers of the mites, which have remained sluggish throughout the winter, are crushed by the expansion of the scales. This mortality does not occur in bulbs that are irregular in shape or have been injured by other organisms, or in those that are left in the soil for two or more consecutive years; on these last, which remain more solid than those that are stored, the mites are less able to penetrate into the basal regions, and many remain

round the neck. In February, or earlier in the south-west, the mites feed extensively on the white, fleshy bases of the leaves and flower-stems and finally over the entire bulb, causing typical yellow streaks and blotches, which are visible when the plant is about 6–8 ins. high. Eggs appear in profusion in March–April, giving rise to an increasing number of males until the sexes are present in about equal numbers in May. In May and early June, the population reaches enormous numbers; the favoured breeding places become over-crowded, eggs are laid up to some inches above the ground, and some mites migrate to other bulbs. At this time the plants may wilt prematurely and the leaves may die. When the foliage actually withers, in early or mid-June, the mites descend again into the bulbs and continue to feed and reproduce on the scale walls. The continuation of these activities over one or more years results in a reduction in the size of the bulb and the production of unhealthy top-growth that tends to die prematurely. The destruction of the flower-bud in the field is unlikely, as comparatively small numbers of mites are present in early spring. At the higher temperature of the forcing house, however, where the mites increase much more rapidly and cover the flower-buds as they protrude from the neck, infested plants produce weak or imperfect flowers, and the flower-bud (and sometimes also the flower-stem) may be destroyed. Eventually, the mites are found, even during the day, distributed freely over the foliage, though the eggs laid on the leaves above the ground seldom hatch. The foliage is abnormally green, with yellow flecks and streaks, and the innermost pairs of leaves at least show crescent-shaped light-coloured areas about $\frac{1}{2}$ in. below the tip.

Dormant bulbs that are infested are dry, light and rather soft and small, and the dried outer scales adhere tightly to the bulb. Infestation seldom kills the bulb, but it facilitates the entry of other destructive organisms.

This mite is readily controlled by immersing the bulbs in water heated to 110°F. for 1 hour. It is suggested that bulbs should be lifted and treated every 2 years. Bulbs for forcing should be examined very soon after they are moved into the forcing house, and if found to contain mites in even comparatively small numbers, they should be sprayed with a white oil emulsion as soon as the leaf-tips part. Liberal quantities should be directed well into the centres of the bulbs.

China (W. E.). **A new Species of Coreidae (Heteroptera) injurious to Coconut in the Solomon Islands.**—*Bull. ent. Res.* **25** pt. 2 pp. 187–189, 1 fig., 1 ref. London, July 1934.

A description is given of *Amblypelta cocophaga*, sp. n., which is injurious to the inflorescence of coconut palms in the Solomon Islands, where it was provisionally identified as *Dasynus* sp. [*R.A.E.*, A **21** 360, 624]. This Coreid also attacks *Macaranga tanarius*, another unnamed euphorbiaceous shrub and a species of *Ficus*. *Pendulinus lutescens*, Dist., described from Queensland, is here referred to *Amblypelta*. Subgenera of *Pendulinus*, described by Stål, that are here recognised as distinct genera, are: *Galaesus* (type *P. hasticornis*, Thnb.), replacing *Pendulinus*, which is preoccupied; *Theraptus* (type *Chariesterus carmelita*, Burm.), which also includes *P. devastans*, Dist.,

and *P. nigromarginatus*, Dist. [**5** 504] ; *Dasynus* (type *Coreus coccocinctus*, Burm.) ; and *Odontoparia* (type *O. nicobarensis*, Mayr). *Anadasynus*, gen. n., is erected for *P. fimbriatus*, Dist., and *Paradasynus*, gen. n., for *Pendulinus rostratus*, Dist.

ROSENBERG (H. T.). **The Biology and Distribution in France of the Larval Parasites of** *Cydia pomonella*, **L.**—*Bull. ent. Res.* **25** pt. 2 pp. 201–256, 15 figs., 4 pp. refs. London, July 1934.

Hibernating larvae of *Cydia pomonella*, L., were collected in 11 representative apple-growing areas of France in 1928 and 1929–30 and sent to the Laboratory of the Imperial Institute of Entomology, where they were placed in outdoor cages. The parasites reared from the various consignments are enumerated, their abundance being indicated, and the prevailing conditions in their places of origin are described. The main part of the paper deals with the separate species ; their alternative hosts are recorded from the literature, their biology is discussed, in some cases in detail, and the egg and larval morphology of some are described.

The percentage of parasitism ranged from 1·37 (Paris district) to 25·75 (Meurthe-et-Moselle), maxima being : 14·29, 11 and 3·11, respectively, by the Ichneumonids, *Pristomerus vulnerator*, Panz., *Ephialtes extensor*, Tasch., and *Trichomma enecator*, Rossi ; 5·71 by the Braconid, *Ascogaster quadridentata*, Wesm. (of which *A. carpocapsae*, Vier., is considered a synonym) ; and 2·63 by the Tachinid, *Arrhinomyia tragica*, Mg., these being the commonest species. Parasitism was generally lowest where apple trees and *C. pomonella* were most abundant. Larval parasitism, destruction of the larvae by birds and their removal within the apples at harvest are considered to be the principal control factors operating in France, parasites alone being incapable of checking infestation. *A. quadridentata* appears to be the most suited for introduction into countries in which *C. pomonella* has become established, and consignments have been sent to New Zealand and South Africa. Should these prove unsuccessful, *E. extensor* might be utilised, despite the poor results obtained in the laboratory with this and allied species. The other three parasites could not be reared in the laboratory and were not sufficiently numerous in collected material for shipment elsewhere.

Other species reared during the work were : the Pteromalid, *Dibrachys affinis*, Masi, and the Ichneumonids, *Cryptus sexannulatus*, Grav., and *Spilocryptus incubitor*, Ström, from *C. pomonella* ; *Eurytoma appendigaster*, Swed., from *C. pomonella*, *Arrhinomyia tragica* and *T. enecator* ; *D. cavus*, Wlk., from *C. pomonella*, *A. tragica* and *Ephialtes extensor* ; the Ichneumonid, *Microcryptus abdominator*, Grav., the Braconid, *Meteorus chrysophthalmus*, Nees, and the Tachinid, *Exorista westermanni*, Zett., probably from *C. pomonella* ; a Braconid, *Dacnusa* sp., from *C. pomonella* or *A. tragica* ; and *Eupelmus urozonus*, Dalm., from *Eurytoma appendigaster* or *C. pomonella*.

The following hyperparasites were obtained : the Ichneumonids, *Hemiteles hemipterus*, F., and *H. macrurus*, Thoms., from *Ephialtes extensor* ; *Perilampus tristis*, Mayr, from *Pristomerus vulnerator* ; *Perilampus laevifrons*, Dalm., from *Ascogaster quadridentata* and possibly from *Pristomerus vulnerator* and *T. enecator* ; and the Torymid, *Monodontomerus dentipes*, Boh., from *Arrhinomyia tragica*.

Koronéos (J.). **Les Coccidae de la Grèce surtout du Pélion (Thessalie). I : Diaspinae.**—Roy. 8vo, vii + 95 pp., 77 pls., 1 fldg. map, 7 refs. Athens, the Author, 1934.

A systematic list is given of Diaspine Coccids collected in Greece, with descriptions of the forms observed (including several new species and subspecies) and records of their food-plants and habitats. One new genus is erected. An index of the species is appended.

Malenotti (E.). **Velocità di azione di alcuni insetticidi invernali contro la *Diaspis leperii*, Sign.** [The Speed of Action of some Winter Insecticides against *Epidiaspis leperii*.]—*Italia agric.* **71** no. 6 pp. 437–441, 2 figs. Rome, June 1934.

The results are given of tests carried out near Verona of 5 proprietary winter insecticides applied at 5 per cent. strength on 9th February 1934 against *Epidiaspis* (*Diaspis*) *leperii*, Sign., on peach. It was found that, as had previously been noticed after treatment with lime-sulphur, the mortality increased with time, the full effect of the sprays not being apparent until 80 days after they had been applied. After an application in January or earlier, a longer interval would probably be required before the degree of control could be estimated, as the cumulative effect of out-door temperature appears to be the factor governing the speed of action of the insecticide. The apparent differences in effectiveness of the insecticides were greatest during the first month and least at the date of the last examination (at the end of April). A mineral oil (winter Volck) acted more rapidly than tar distillates, but one of the latter (Neodendrin [*cf. R.A.E.*, A **21** 441]) proved ultimately superior.

B[oselli] (F. B.). **Relazione sulla lotta contro le cavallette eseguita nel Vallo di Diano—Giugno-Luglio 1933.** [Report on Work against Locusts in the Vallo di Diano in June–July 1933.]—*Picentino* **90** no. 5–6 pp. 154–157. Salerno, 1934.

In this district of the Province of Salerno, an outbreak of locusts, almost exclusively *Calliptamus italicus*, L., began in June 1933 [*cf. R.A.E.*, A **20** 616]. Sprays were applied on a large scale for control, the chief insecticide used being a solution of sodium arsenite.

Bellio (G.). **Le tavole dosimetriche nella fumigazione cianidrica degli agrumi.** [Dosage Tables in the Fumigation of *Citrus* Trees with Hydrocyanic Acid Gas.]—*Ann. Ist. sup. agrar. Portici* (3) **6** (1933), pp. 154–252, 5 figs., 107 refs. Portici, 1934.

The author surveys the problems presented by the tent fumigation of *Citrus* trees with hydrocyanic acid gas and discusses the history and technique of the principal methods employed in various countries and the published dosage tables, which are here reproduced. He gives a revised table, constructed on the basis of the above data and of practical experiment, that is applicable to the fumigation of individual trees infested by *Chrysomphalus dictyospermi*, Morg., in Italy, the gas being generated from sodium cyanide by means of dilute sulphuric acid.

SPEYER [W.]. **Obstbaum-Fanggürtel als Fanggerät des "angewandten" Entomologen.** [Fruit-tree Trap-bands as a Collecting Device for the Economic Entomologist.]—*Ent. Bl.* **30** no. 3 pp. 117–119, 3 refs. Krefeld, 30th June 1934.

Valuable data on the fluctuations of species in insect communities can be obtained by inspection of shelter bands placed on trees. A list is given of Coleoptera found in bands on fruit trees in the Lower Elbe district between 1926 and 1932, most of which have been included in more detailed accounts [see next abstract, etc.].

SPEYER (W.). **Die an der Niederelbe in Obstbaumfanggürteln überwinternden Insekten. III. Mitteilung. Coleoptera : Coccinellidae.** [Insects hibernating in Fruit-tree Trap-bands in the Lower Elbe Districts. Third Communication.]—*Z. PflKrankh.* **44** no. 7 pp. 321–330, 13 refs. Stuttgart, 1934.

In this third communication [*cf. R.A.E.*, A **21** 203, 581], an annotated list is given of Coccinellids found between 1926 and 1932 in shelter-bands on fruit trees or observed on various other plants. A decrease in their numbers that has occurred in orchards is attributed either to their destruction by tar distillate sprays or to the control of Psyllids, Aphids and Coccids by these insecticides. The latter alternative seems to be supported by the great increase of *Stethorus punctillum*, Wse., since it is predacious on mites, such as *Paratetranychus pilosus*, C. & F., that are not affected by tar distillates. This Coccinellid is, however, a very small species and so is able to shelter in minute fissures into which the sprays do not easily penetrate.

As Coccinellids only enter hibernation late in autumn, their destruction in the bands can be avoided by removing these in September.

LEHMANN (H.). **Luzerneschädlinge. 2. Diptera, Minierfliegen : *Agromyza frontella* Rondani und *Agromyza nana* Meigen, Gallmücken : *Contarinia medicaginis* Kieffer, *Asphondylia miki* Wachtl, *Dasyneura ignorata* Wachtl und *Jaapiella medicaginis* Kieffer.** [Lucerne Pests. 2. Diptera.]—*Z. PflKrankh.* **44** no. 7 pp. 331–348, 29 refs. Stuttgart, 1934.

The following is largely taken from the author's summary of observations on lucerne pests in Thuringia in 1933 [*cf. R.A.E.*, A **22** 3] : *Domomyza* (*Agromyza*) *frontella*, Rond., and *D.* (*A.*) *nana*, Mg., which mine in the leaves of lucerne, have two generations a year, overwintering in the ground as pupae. Both these Agromyzids also occur on clover (*Trifolium* spp.), and the latter also on sainfoin (*Onobrychis sativa*), sweet clover (*Melilotus*), etc. *Phytomyza affinis*, Fall. [**12** 438] and *Agromyza nigripes*, Mg. [**2** 578] have been recorded as lucerne miners, but the former breeds exclusively on thistles, and the occurrence of the latter on lucerne is doubtful.

The larvae of the Cecidomyiid, *Contarinia medicaginis*, Kieff., live gregariously in the flower-buds of lucerne, the galls of the three generations being found in mid-June, up to the end of July, and early in August, respectively. The prepupae hibernate, and pupation occurs, just below the surface of the ground. Similar galls on sainfoin are caused by *Contarinia onobrychidis*, Kieff., which the author considers probably distinct from *C. medicaginis*. The Torymid parasite, *Pseudotorymus leguminum*, Ruschka, was obtained exclusively from

sainfoin. It lived singly in the galls, feeding on the Cecidomyiid larvae and pupating there. It probably hibernates in the adult stage. As it is the later flowers of the second crop that are chiefly attacked by the larvae of *C. medicaginis*, it is planned to advance the date of both mowings.

Jaapiella medicaginis, Rübs., which has been confused with the foregoing by some writers [*cf.* **13** 397], but which forms galls only in leaf folds, and *Asphondylia miki*, Wachtl, which forms galls in the pods, are apparently of no economic importance in Germany. *Dasyneura ignorata*, Wachtl, which forms galls at the tips of the shoots [**12** 437] and in some years occurs in sufficient numbers to check their growth, may be controlled by early mowing, the infested galls being destroyed when the fodder is consumed.

Records of *Contarinia loti*, DeG., which forms blossom-galls only on *Lotus* and *Vicia*, as attacking lucerne [**10** 61 ; **11** 122] generally refer to *C. medicaginis*.

VON OETTINGEN (H.). **Zwei neue Schädlinge an Futterpflanzen** [Two new Pests of Fodder Plants.]—*NachrBl. dtsch. PflSchDienst* **14** no. 7 pp. 65–66, 2 figs. Berlin, July 1934.

In eastern Brandenburg in 1933, larvae of *Phorbia* (*Chortophila*) *dissecta*, Mg., were found in June feeding inside newly sown maize seeds, particularly those that had been sown early, and larvae of *Halidayella* (*Lauxania*) *aenea*, Fall., were observed in May in the tap-roots of clover, having evidently mined from the root-collars. The larvae of these flies, which have not previously been recorded as pests in Germany, are briefly described.

KAPUŚCIŃSKI (S.). **Beitrag zur Kenntnis der Parasiten der** *Pseudoclavellaria amerinae* **L. (Hym., Tenthred.).** [Contribution to the Knowledge of the Parasites of *P. amerinae*.] [*In Polish.*]—*Polsk. Pismo ent.* **12** (1933) pp. 62–72, 2 figs., 1 pl., 11 refs. Lwów, July 1934. (With a Summary in German.)

The larvae of the sawfly, *Pseudoclavellaria amerinae*, L., feed on the leaves of willows, hibernating in net-like cocoons, which they spin as early as mid-August. They pupate in the following May, and the adults emerge after about 15 days. Of cocoons collected in January 1933 near Lwów, about 30, 27 and 23 per cent. were parasitised, respectively, by the Ichneumonids, *Cryptus leucocheir*, Ratz., and *Ipoctonus nigriceps*, Grav., and the Tachinid, *Exorista glauca* var. *clavellariae*, Br. & Berg. The larva of *C. leucocheir* abandons the host larva in autumn and hibernates in a cocoon within that of the host, from which the adult parasite emerges in June. It was itself parasitised by *Hemiteles inimicus*, Grav. (which has not previously been recorded from Poland) apparently while still within the host larva, the cocoon of the hyperparasite occurring inside that of the primary parasite. In the insectary, an adult of *H. inimicus* appeared as early as 5th May. The larva of *I. nigriceps* overwinters in the host larva and in spring spins a cocoon inside that of the latter, the adults emerging about 30 days later (in June). The Tachinid abandons its host about October and pupates outside the cocoon of the latter ; the adults emerge in June.

Hibernating larvae of *P. amerinae* were preyed on by the Dermestids, *Megatoma undata*, L., and *Globicornis corticalis*, Eichh.

Mokrzecki (Z.). **Die in den Forstschädlingen lebenden Parasiten des 1. und 2. Grades aus der Gruppe der Chalcidoidea.** [Chalcidoid Parasites and Hyperparasites of Forest Pests. (*In Polish.*)]—*Polsk. Pismo ent.* **12** (1933) pp. 143–144. Lwów, July 1934.

The following species are recorded from Poland: *Eurytoma appendigaster*, Swed., reared from *Apanteles fulvipes*, Hal., parasitising the gipsy moth [*Porthetria dispar*, L.]; *Monodontomerus dentipes*, Boh., which is a primary parasite of *Diprion* (*Lophyrus*), but also attacks *Apanteles glomeratus*, L., parasitising the large cabbage butterfly [*Pieris brassicae*, L.]; *Mokrzeckia* (gen. n.) (*Pteromalus*) *pini*, Htg., a hyperparasite of the pine Lasiocampid [*Dendrolimus pini*, L.]; *Habrocytus microgasteris*, Kurd., and *Catolaccus ater*, Ratz., both of which are recorded as hyperparasites of *Acronycta rumicis*, L.; *Dibrachys cavus*, Wlk. (*boucheanus*, Ratz.), which is a primary parasite of Dipterous pupae and also attacks its own species; *Mormoniella vitripennis*, Wlk., which parasitises Dipterous pupae and is recorded from *Sarcophaga* sp. parasitic on *Dendrolimus pini*; and *Pleurotropis nawai*, Ashm., which usually attacks parasites of Tachinids and Ichneumonids and has been reared from *Dibrachys* parasitising *Eurytoma* when this last was attacking Ichneumonids as a tertiary parasite.

Kéler (S.). **Ueber die Kopfindices der Larven und die Dyar'sche Hypothese.** [Head-measurements of the Larvae of *Porthetria dispar*, and Dyar's Hypothesis. (*In Polish.*)]—*Polsk. Pismo ent.* **12** (1933) pp. 173–180, 23 graphs, 3 refs. Lwów, July 1934. (With a Summary in German.)

Details are given of measurements of the head capsules of larvae of *Porthetria* (*Lymantria*) *dispar*, L., made to test Dyar's hypothesis that the width of the head of a Lepidopterous larva increases in geometrical progression in successive instars [*cf. R.A.E.*, A **17** 178; **20** 579]. This proved applicable to the male larvae, the average ratio of the widths being 1 : 1·6, but not to the female larvae, in which the ratio varied from 1 : 1·7 to 1 : 1·3. The author also studied the head-index (width × 100 ÷ length) of the larvae, but found that it varied irregularly with the instar in both sexes and so affords no criterion for judging the age of a larva.

Mokrzecki (Z.). **Raub- und Schmarotzer-Insekten des Buchdruckers *Ips typographus* L. in Polen.** [Predators and Parasites of *I. typographus* in Poland.]—*Polsk. Pismo ent.* **12** (1933) pp. 275–289, 2 pls., 5 refs. Lwów, July 1934.

Notes are given on the bionomics of 33 species of insect enemies of *Ips typographus*, L., on spruce observed in 1922–24 in the forest of Bialowies and in the Tatra Mountains in Poland. The parasites, with the exception of the Pteromalid, *Rhopalicus maculifer*, Först. (of which *R. annellus*, Thoms., is a synonym) were mentioned in a previous report [*R.A.E.*, A **12** 105]. The Braconid there recorded as *Iphiaulax* (*Bracon*) *flavator*, F., has since been identified as *Coeloides bostrychorum*, Giraud. Of the predators not previously recorded, the most important were the Carabid, *Tachyta nana*, Gyll., the Histerid, *Platysoma* (*Cylistosoma*) *oblongum*, F., the Nitidulids, *Glischrochilus quadripunctatus*, L. (*quadripustulatus*, L.) and *Rhizophagus depressus*, F., and the Neuropteron, *Raphidia ophiopsis*, L.

ALVARADO (J. A.). **Nuestros insectos auxiliares. Tortuguilla blanca algodonosa (Familia coccinélidos.).** [Our Insect Auxiliaries.]—*Rev. agric. Guatemala* **12** no. 4 pp. 259–262. Guatemala, May 1934.

This popular article records observations of a Coccinellid that was found to attack Coccids on coffee in Guatemala under both natural and experimental conditions. The larva is described. An editorial footnote states that the insect concerned is probably *Rodolia* (*Novius*) *cardinalis*, Muls., which is known to be present in some parts of the country.

BALCH (R. E.). **The European Spruce Sawfly** (*Diprion polytomum* **Hartig**).—*Spec. Circ. Div. For. Ins. Dep. Agric. Canada* [no. 8] 3 pp., 1 pl. Ottawa, March 1934. [Recd. 9th July 1934.]

Infestation of spruce by *Diprion polytomum*, Htg., has been spreading since it was first observed in the Gaspe Peninsula, Quebec, in 1930 [*R.A.E.*, A **20** 590], and in 1933 the trees were severely damaged over an area of more than 4,000 sq. miles extending into New Brunswick. The adults, which emerge in July–August, are sluggish, but in warm weather they become active and oviposit in slits in the needles. Males are very rare in Canada. The larvae feed on spruce needles, and when full-grown they drop to the ground and spin cocoons among the moss and litter. They occur on the trees from July to October, sometimes being found when snow is falling. Some remain in the cocoons for 3 winters before pupating (in spring). In parts of New Brunswick, development is earlier than in Quebec, and there are two generations a year. Besides white and black spruce [*Picea glauca* and *P. mariana*], red and Norway spruce [*P. rubra* and *P. abies* (*excelsa*)] are attacked. The new foliage is not eaten until fully grown, and even then older needles are preferred. Infestation is usually lighter in the tip of the crown.

Spraying or dusting with calcium arsenate when the young larvae appear is completely effective, and may be used for control on valuable trees.

DE GRYSE (J. J.). **The European Pine Shoot Moth** (*Rhyacionia buoliana* **Schiff.**).—*Spec. Circ. Div. For. Ins. Dep. Agric. Canada* [no. 9] 3 pp., 1 pl. Ottawa 1934. [Recd. 9th July 1934.]

In Canada, where it occurs in the neighbourhood of Montreal (Quebec) and in several parts of Ontario [*cf. R.A.E.*, A **20** 650; **22** 305], the adults of *Rhyacionia buoliana*, Schiff., begin to emerge at the end of spring and oviposit in June and July. All native or imported species of pine are attacked, but white pine [*Pinus strobus*] a little less readily than the other species. The larvae are numerous about the middle of July, and feed actively until late autumn. They overwinter inside the buds and resume feeding in early spring (mid-April), pupating in the first part of June. Among the control measures mentioned [*cf.* **21** 567; **22** 394], a spray of 3 lb. lead arsenate, ¾ pint nicotine sulphate, 3 lb. potash fish-oil soap and 40 gals. water has given satisfactory results against larvae that have not yet penetrated the buds. A similar spray applied early in April before the overwintering larvae become active may also prove effective.

DE GRYSE (J. J.) & SCHEDL (K.). **An Account of the Eastern Hemlock Looper, *Ellopia fiscellaria* Gn., on Hemlock, with Notes on allied Species.**—*Sci. Agric.* **14** no. 10 pp. 523–539, 1 pl., 1 fig., 2 refs. Ottawa, June 1934. (With a Summary in French.)

Much of this information on an outbreak of *Ellopia fiscellaria*, Gn., on forest trees in the region of the Muskoka Lakes, Ontario, during 1928 and 1929 has already been noticed [*R.A.E.*, A **19** 724]. Previous outbreaks of this and allied species of the genus [*cf.* **20** 31] in Canada and the United States are recorded and discussed. In 1929, the eggs, some of which may be laid on buildings, in the small cracks of shingles, on stumps and on fallen trees, probably hatched about 10th June. The needles of eastern hemlock (*Tsuga canadensis*), juniper, spruce and some larches are cut near the base or attacked from one side only; the small twigs of white cedar [*Thuja occidentalis*] are severed within about an inch of the end; the needles of white pine (*Pinus strobus*) are attacked from the side, the thin strands that remain curling up in a characteristic manner; and irregular cuts are made in the leaves of hardwoods, of which oak, maple, wild cherry and blueberry [*Vaccinium*] were most commonly attacked, the last being the only broad-leaved plant that was completely defoliated.

The larvae may be killed over small areas by spraying between 20th June and 15th July with lead arsenate. At least 30 per cent. are estimated to descend to the ground during the feeding period and may be prevented from returning by the use of adhesive bands. The application by aeroplane [*cf.* **18** 285; **19** 219; etc.] in June 1929 of a dust of undiluted calcium arsenate containing 40 per cent. arsenic pentoxide over about 1,000 acres of woodland caused 90–100 per cent. mortality in 24 hours where it remained undisturbed, and about 80 per cent. after 48 hours where heavy rain fell 6 hours after treatment. The amount of dust applied to any one area could not be accurately determined, but the rate was theoretically 30 lb. per acre over heavily infested areas. The dusting apparatus and its operation are briefly described. The absence of moths in September is considered to be due partly to the timely application of the dust. Planned felling to reduce the percentage of hemlock in stands would be a valuable indirect method of control.

EHRLICH (J.). **The Beech Bark Disease, a *Nectria* Disease of *Fagus*, following *Cryptococcus fagi* (Baer.).**—*Canad. J. Res.* **10** spec. no. pp. 593–692, 9 pls., 19 figs., 143 refs. Ottawa, June 1934.

The name "beech bark disease" is proposed for a disease of beech (*Fagus grandifolia* and *F. sylvatica*) caused by a parasitic ascomycetous fungus, an undescribed variety of *Nectria coccinea*, following attack by *Cryptococcus fagi*, Bär. From a review of its history in Europe, it is concluded that the disease is not now regarded as so serious as formerly but that it occurs over a wide area in the centre and west of the continent. In North America, it has been prevalent for approximately 15 years, having first attracted attention in Nova Scotia and being now active also in southern New Brunswick [*R.A.E.*, A **21** 167] and in areas in Maine [**22** 394]. The Coccid has been present also for perhaps 10 years in eastern Massachusetts.

Studies in Canada (chiefly on *F. grandifolia*) showed that fruiting bodies of the fungus develop in areas on the stem and branches previously occupied by the Coccid. As infestation progresses, the foliage

and twigs wither and die, whole branches cease to put forth leaves, and large areas of bark on the trunk crack, loosen from the wood and fall away. The fungus is able in general to enter and infect extensively only bark on which the insect has been present for a year or more. All stages of *C. fagi* are described, its distribution is discussed and its life-cycle in various countries is summarised in a table. The factors that influence infestation include the health of the tree, the nature of the bark, soil, position and climate.

The disease can be controlled on ornamental trees by early eradication of the Coccid with insecticides [*cf.* **20** 282]. In forest stands, infected, dying and recently killed timber should be removed. Beech should be grown on broad ridge tops rather than on steep slopes, so as to produce an environment unfavourable to the Coccid, and attention should be devoted to the possibility of its biological control.

Richardson (C. H.), Glover (L. H.) & Ellisor (L. O.). **Penetration of gaseous Pyridine, Piperidine and Nicotine into the Bodies of certain Insects.**—*Science* **80** no. 2064 pp. 76–77, 5 refs. New York, 20th July 1934.

A technique is described by which it is possible to measure approximately the amounts of toxic gases absorbed by insects. The authors' experiments with adults of *Periplaneta americana*, L., and *Melanoplus femur-rubrum*, DeG., and larvae of *Heliothis obsoleta*, F., of which this is a preliminary account, showed that relatively large quantities of the gases tested (pyridine, piperidine and nicotine) penetrated the cuticle of the insects, apparently without necessarily first entering the body through the spiracles.

Isely (D.) & Schwardt (H. H.). **The Rice Water Weevil.**—*Bull. Arkansas agric. Exp. Sta.* no. 299, 44 pp., 9 figs., 3 graphs, 15 refs. Fayetteville, Ark., May 1934.

All stages are described of *Lissorhoptrus simplex*, Say (rice water weevil), and an account is given of its bionomics in eastern Arkansas [*cf. R.A.E.*, A **16** 386; **20** 414]. The results are given of weekly observations of the abundance of the various stages in 1930–33. Development was much slower early in the season. Infestation was generally heavier in plots flooded in mid-season (June) than in those flooded late (July). It was, however, lightest in plots that had been flooded extra early (16th May), and in these rice that had been sown on 10th April was less heavily infested than that sown on 25th April. Rains before flooding frequently make possible an early infestation of small rice, and this is apparently more susceptible to injury than older rice. Marked differences were also observed in the susceptibility of different varieties.

Field experiments in control by means of different systems of drainage are reviewed. The drained plots yielded an average of 18 per cent. more grain than the undrained ones. The best time for draining was found to be just before severe root-pruning by the larvae is beginning to be evident, usually about 3–4 weeks (or later for early rice) after first flooding, when most of them are in the third instar [*cf.* **20** 415]. The drainage period should be extended until the soil is thoroughly dried; except in very hot, dry weather, it should not

be less than 2 weeks. Delaying drainage as long as possible without injury to the rice plants favours increased yields, the greatest increase having been obtained in plots drained 29 days after flooding.

HOUGH (W. S.). **Colorado and Virginia Strains of Codling Moth in Relation to their Ability to enter sprayed and unsprayed Apples.**—*J. agric. Res.* **48** no. 6 pp. 533–553, 1 fig., 13 refs. Washington, D.C., 15th March 1934. [Recd. July 1934.]

The following is taken from the author's summary of further comparative studies of strains of *Cydia* (*Carpocapsa*) *pomonella*, L., from the Grand Valley of Colorado and the Shenandoah Valley of Virginia [*cf. R.A.E.*, A **16** 514 ; **17** 365] in 1929–33 :—Colorado larvae reared under Virginia climatic conditions since 1928 have consistently demonstrated a distinct superiority over Virginia larvae in their ability to enter unsprayed apples, as well as those sprayed with lead arsenate, cryolite, barium fluosilicate, rotenone, cuprous cyanide or nicotine. From 1929 to 1933, strains (designated as Colorado-K and Virginia-K) were reared on fruit freshly sprayed with lead arsenate ; in 1933, the order of ability to enter fruit sprayed with various insecticides was : Colorado-K, Colorado, Virginia-K, Virginia. Colorado-Virginia crosses, through 10 generations, maintained an ability intermediate between those of the parent strains to enter fruit sprayed with lead arsenate. In the second instar, Colorado larvae were slightly superior to Virginia larvae in entering unsprayed or sprayed fruit. Larvae of both strains were more successful in entering unsprayed or sprayed fruit when the temperature was relatively high. Careful observations on the habit of rejecting apple tissue while entering the fruit failed to reveal any significant difference between the strains.

Colorado larvae endured starvation better than Virginia larvae. The percentage of survival of starved larvae was higher during cool weather. There was little or no difference in tolerance to potassium cyanide fumigation among recently deposited eggs (less than 24 hours old), but the resistance to fumigation of eggs with well developed embryos or of newly hatched larvae markedly decreased in the order : Colorado-K, Colorado, Virginia-K, Virginia.

The increased proportion of more vigorous individuals of a given strain produced by rearing the larvae throughout several generations on freshly sprayed fruit was most marked in the fully developed embryos and in newly hatched larvae. It was also quite evident in the second instar, but had largely disappeared in the full-fed larvae.

[**Insect Pests in Utah.**]—*Leafl. Utah agric. Exp. Sta.* nos. 41, 43, 44, 45, 49, 52. Logan, Utah, May 1934.

Of these leaflets [*cf. R.A.E.*, A **22** 68, 358], Nos. 44 and 45 are by G. F. Knowlton and C. J. Sorenson and the others by Knowlton only.

In no. 41, it is stated that 1–3 tons sugar-beet may be lost per acre in various sections of Utah owing to severe infestations of *Pemphigus betae*, Doane (beet root-aphis), which also attacks mangel. The eggs overwinter on poplar, and winged forms migrate about the end of June to the beet fields, where several parthenogenetic generations ensue. Many wingless females, however, overwinter in the soil of the beet fields and reproduce in spring, whereas others of the same generation

produce winged sexuparae in autumn. Natural enemies, which include the larvae of *Chloropisca glabra*, Mg. [**6** 492], help to control the subterranean forms. The maintenance of proper moisture conditions [*cf.* **3** 335, 578] prevents extensive larviposition by the spring migrants, checks the development of the Aphid and encourages the growth of the plant.

No. 43 deals with *Nysius ericae*, Schill., a pest of numerous vegetables and small fruits in all agricultural areas in the State. The bugs may be destroyed on weeds by means of kerosene or by burning the vegetation, and on crops by a spray of nicotine sulphate and soap or a dust of calcium cyanide. Pyrethrum extract sprays may be used on second-year sugar-beets set out for seed production or on other valuable crops. Migrating nymphs may be destroyed by flooding, irrigating or cultivating the land.

Notes are given in No. 44 on the bionomics and control of *Aphis pomi*, DeG., *Anuraphis* (*A.*) *roseus*, Baker, *Rhopalosiphum prunifoliae*, Fitch, and *Anuraphis* (*A.*) *bakeri*, Cowan, on apple [*cf.* **19** 202 ; **22** 322 ; etc.], and in No. 45 on *Myzus cerasi*, F. [**6** 121] infesting sweet cherries. Nicotine sulphate, for the control of all these Aphids, may be combined with various sprays against other pests. Those containing lime-sulphur or oil emulsion cannot safely be applied to cherry after the buds have begun to show green.

No. 49 deals with *Phthorimaea* (*Gnorimoschema*) *operculella*, Zell., which is now definitely established on potatoes in southern Utah. Control is best obtained by cultural methods [**21** 96, etc.]. Infested tubers in storage may be fumigated with 5 lb. carbon bisulphide per 1,000 cu. ft. space at 65°F. or above, 2–3 treatments of 48 hours each often being necessary during the winter. Storage at 37°F. prevents development.

No. 52 contains information on *Epicauta maculata*, Say, and *E. puncticollis*, Mannerh., the adults of which destroy the leaves and flowers of numerous vegetables, sometimes causing a complete failure of the crop. They may be repelled from valuable crops by sprays of lead or calcium arsenate (5 lb. to 100 U.S. gals. water) or Bordeaux mixture or by dusts of sodium fluosilicate. On plants liable to be scorched by strong arsenical sprays, the beetles may be brushed off into cans containing oil. It is doubtful whether the destruction of grasshopper eggs by the larvae of these Meloids offsets the damage caused by the adults.

LUND (H. O.). **Some Temperature and Humidity Relations of Two Races of *Trichogramma minutum* Riley (Hym. Chalcididae).**—*Ann. ent. Soc. Amer.* **27** no. 2 pp. 324–340, 2 figs., 12 refs. Columbus, Ohio, June 1934.

The following is taken from the author's summary and conclusions of investigations on the biology of *Trichogramma minutum*, Riley, in which a yellow race from California and a grey race from Louisiana were reared in eggs of *Sitotroga cerealella*, Ol., at four different relative humidities (30, 50, 70 and 100 per cent.) at each of four temperatures (32, 27, 22 and 17°C. [89·6, 80·6, 71·6 and 62·6°F.]):—The median temperature range for which the thermal constant seems to hold good for *Trichogramma* is only from about 20 to 30°C. [68–86°F.] The theoretical threshold of development is about 15°C. [59°F.]. The period of development in the host eggs bears an inverse relation to the relative humidity. There is apparently no significant difference in

the length of the life-cycle of males and females at 27°C. and 70 per cent. relative humidity. The ratio of females to males, which averaged 1 : 0·654 for the grey race and 1 : 0·578 for the yellow one, was not affected by humidity or temperature even as low as 12°C. [53·6°F.] [*cf. R.A.E.*, A **20** 34]. Development was most rapid at 32°C. and 100 per cent. relative humidity, which were the optimum conditions for both races. The mortality of the host, and particularly of the parasite, increases with a decrease in humidity, and that of the latter also increases at both extremes of temperature. The mortality of the parasites within the eggs varied much more widely with temperature and humidity than that of unparasitised eggs.

As compared with the yellow race, the grey race develops more slowly at low temperatures and more rapidly at high ones and has a greater relative mortality at low humidities and a slightly less one at high humidities, and its biotic potential is more strikingly affected by a lowering of humidity and temperature.

SAKIMURA (K.) & CARTER (W.). **The Artificial Feeding of Thysanoptera.**—*Ann. ent. Soc. Amer.* **27** no. 2 pp. 341–342, 6 refs. Columbus, Ohio, June 1934.

Studies carried out in Hawaii confirm the view that the mouthparts of Thysanoptera are used entirely for sucking [*cf. R.A.E.*, A **3** 571 ; etc.]. Examples of *Thrips tabaci*, Lind., were fed on solutions of 3 per cent. cane sugar, to which had been added 0·1 or 0·01 per cent. methylin blue or 1 per cent. haematoxylin, contained in tubes capped with fish-skin membranes. The presence of the stain in the intestinal tract after 2–3 days showed that the insects had fed ; no trace of it could be detected in the tissue. *T. tabaci* was also fed successfully on extracts of *Emilia sonchifolia*, a wild host of the virus of yellow spot disease of pineapple [*cf.* **20** 639], but preliminary experiments on the ability of the thrips to acquire the virus in this manner have given negative results.

VAN DYKE (E. C.). **A Root-boring** *Derobrachus.*—*Pan-Pacif. Ent.* **10** no. 2 p. 58. San Francisco, Calif., April 1934.

The larvae of the Prionid, *Derobrachus geminatus* var. *forreri*, Bates, are recorded as boring in the roots of olive in California.

EBELING (W.). **Observation on a Method of Dissemination Employed by Mites.**—*Pan-Pacif. Ent.* **10** no. 2 p. 89. San Francisco, Calif., April 1934.

In the course of experiments on *Paratetranychus citri*, McG., on orange seedlings in California, the mites were observed to migrate to fresh leaves from those depleted of chlorophyll by dropping on single threads. This method of dissemination might lead to their carriage for some distance by wind.

EASTERLING (G. R.). **A Study of the Insect Fauna of a Coniferous Reforestation Area in southeastern Ohio.**—*Ohio J. Sci.* **34** no. 3 pp. 129–146, 1 diagr., 1 map, 21 refs. Columbus, Ohio, May 1934.

An annotated list is given of the insects observed in weekly inspections in the summer and autumn of 1932 in a representative area in south-eastern Ohio re-afforested with conifers between 1908 and 1928. The trees most seriously attacked were (in the order named)

Pinus strobus, *P. sylvestris* and *P. banksiana*; *P. resinosa* and species of *Larix*, *Picea* and *Abies* were relatively unaffected. Trees of *P. strobus* under 10 years old were seldom attacked; on older trees, the first attack was made by *Ips* (*Pityogenes*) *punctipennis*, Lec. (which caused the death of several of this species, *P. sylvestris* and *P. banksiana*), followed by *Pissodes approximatus*, Hopk. (which might become a serious pest if abundant) and then by secondary pests such as *Monochamus notatus*, Drury (*confusor*, Kby.). In one stand of *P. strobus* 15–20 years old, 16·9 per cent. of trimmed trees and only 1·34 per cent. of untrimmed ones were heavily infested in late summer with *Chermes* (*Adelges*) *pinicorticis*, Fitch, which was partly controlled by the predacious larvae of *Syrphus* spp. The lower branches of older trees of *P. strobus* and *P. resinosa* were often heavily infested with *Chionaspis pinifoliae*, Fitch, of which there were apparently two broods in the year [*cf. R.A.E.*, A **18** 353]. *Chilocorus stigma*, Say (*bivulnerus*, Muls.) was a fairly abundant predator on this scale.

A table is appended showing the principal insect pests of conifers in eastern North America, with indications of their food-plants, the type and extent of the injury they cause, their distribution in the United States and Canada, and the likelihood of their introduction into south-eastern Ohio.

DeLong (D. M.). **The present Status of Cryolite as an Insecticide.**—*Ohio J. Sci.* **34** no. 3 pp. 175–200, 2 figs., 80 refs. Columbus, Ohio, May 1934.

From a discussion of the chemical and physical properties of cryolite (sodium aluminium fluoride) and a review of the literature on its use as an insecticide, the author concludes that it is well adapted for this use, combining a relatively high toxicity to insects with a minimum of injuriousness to plants, the synthetic material being superior to the natural. In experiments by him in Ohio, it gave good control of *Thyridopteryx ephemeraeformis*, Haw., *Hyphantria cunea*, Drury, and *Hemerocampa leucostigma*, S. & A., on shade trees without injury to the foliage. He points out that studies on the toxicity of the fluorine compounds to man and other mammals have given contradictory results, that there are no data on the effects of eating plants sprayed with them, and that restrictions limiting the tolerance of fluorine to 0·01 grain per lb. fruit are based on results obtained with the more soluble neutral fluorides, which are probably not applicable to relatively insoluble salts such as cryolite.

Cohee (R. F.) & St. John (J. L.). **Lead Ursolate in Relation to Fruit Cleaning.**—*Industr. Engng Chem.* Industr. Edn. **26** no. 7 pp. 781–782, 9 refs. Easton, Pa, July 1934.

Markley and Sando found that 26 per cent. of the wax coating of apples, the development of which affects the removal of residues from lead arsenate sprays particularly when combined with fish or mineral oils, consists of ursolic acid. In the present paper, the preparation of lead ursolate (in which the lead was found to be tetravalent) from ursolic acid isolated from apple wax is described, and its solubility is discussed. This salt is insoluble in a 1·5 per cent. solution of hydrochloric acid and slightly soluble in a 10 per cent. solution of sodium silicate. The solubility is very slightly increased by the addition of

soap and kerosene. The presence on the fruit of lead ursolate or other combinations of lead with wax constituents might thus make it difficult to remove the last traces of lead by the present methods. The value of sodium silicate has been increased in the laboratory by the addition of 1 per cent. of chloroform, benzene, toluene or xylene, in which both the wax and the salt and also mineral and fish oils are soluble. Chloroform appears to be the most efficient, but is the most volatile ; of the others, xylene probably involves the least fire hazard. The addition of such organic solvents to sodium silicate may permit the use of lower temperatures or smaller concentrations during washing, with a consequent decrease in fruit injury. Care may be necessary, however, not to remove so much of the waxy coating that abnormal wilting occurs during storage.

Smith (M. C.) & Leverton (R. M.). **Comparative Toxicity of Fluorine Compounds.**—*Industr. Engng Chem.* Industr. Edn. **26** no. 7 pp. 791–797, 4 figs., 19 refs. Easton, Pa, July 1934.

In view of the increasing use of fluorine compounds as insecticides and their known effect on human teeth [*cf. R.A.E.*, A **21** 254], investigations were undertaken with rats, which showed that the daily ingestion of fluorine (in any form) at the rate of 1 mg. per kg. of body weight marks the teeth. Considerably larger dosages are necessary to interfere with the growth rate, food utilisation and reproduction, or to cause the death of the animals or produce the most severe type of damage to the teeth. Sodium, potassium or ammonium fluoride or barium or sodium fluosilicate retarded growth and decreased the utilisation of food when incorporated in the diet of the rats at the rate of 0·0226 per cent. fluorine (equal to a daily average of about 24 mg. per kg. body weight) for 6 weeks ; 10 times as much fluorine when combined as cryolite (sodium aluminium fluoride), or 20 times as much when combined as calcium fluoride, was necessary to produce a similar slight stunting. Similarly, fluorine in any of the other fluorides or the fluosilicates at 0·0904 per cent. killed the rats in 9–11 days, whereas 3·6 and 5·4 per cent. were necessary with cryolite and calcium fluoride respectively. The amount of fluorine required to cause initial damage to rat incisors, however, was so small that differences in solubility of the compounds was not a factor and no differences in toxicity of fluorine in the various compounds studied could be noticed.

It has been determined that 1 lb. of apples sprayed with barium fluosilicate bears about 2·5 mg. [0·0385 grain] fluorine. A large apple will thus provide as much fluorine as 4 glasses of water containing 1 part per million, which if taken daily by a child during the development of the permanent teeth, causes them to be mottled. The authors conclude, therefore, that the use of fluorine compounds against insects on fruit and vegetables is most dangerous, and that unless their use is controlled or the removal of deposits enforced mottling of the enamel of the teeth will become more widespread.

Hempel (A.). **Descripção de tres especies novas, tres generos novos e uma subfamilia nova de Coccideos (Hemiptera, Homoptera).**—*Rev. Ent.* **4** fasc. 2 pp. 139–147, 4 figs. Rio de Janeiro, 27th June 1934.

The following new genera and species of Coccids are described from Brazil : *Pseudotectococcus anonae*, producing galls on the leaves of a

cultivated species of *Anona*; *Canceraspis brasiliensis*, on a native palm; and *Neoparlaspis myrciariae*, on *Myrciaria glomerata*. *Aclerda campinensis*, n. n., is proposed for *A. sacchari*, Hempel, described from sugar-cane in Brazil [*R.A.E.*, A **20** 462], the latter name being preoccupied [by *A. sacchari*, Teague (**14** 123)].

BORGMEIER (T.). *Lyctus brunneus* **Steph. no Rio de Janeiro (Col. Lyctidae).**—*Rev. Ent.* **4** fasc. 2 p. 278. Rio de Janeiro, 27th June 1934.

Lyctus brunneus, Steph., was found in 1934 in furniture in Rio de Janeiro, together with two natural enemies, the predacious Clerid, *Tarsostenus univittatus*, Rossi, and the Braconid parasite, *Monolexis lycti*, Cress. The only previous record of *L. brunneus* from Brazil was in 1920 [*R.A.E.*, A **9** 59].

OCFEMIA (G. O.). **The Transmission of the Fiji Disease of Sugar Cane by an Insect Vector.**—*Natural appl. Sci. Bull.* **3** no. 3 pp. 277–280, 5 refs. Manila, November 1933.

OCFEMIA (G. O.). **An Insect Vector of the Fiji Disease of Sugar Cane.**—*Amer. J. Bot.* **21** no. 3 pp. 113–120, 5 figs., 4 refs. Lancaster, Pa, 1934.

The first paper includes a discussion of the similarity of Fiji disease of sugar-cane to bunchy-top of Manila hemp (*Musa textilis*), both in symptoms [*cf. R.A.E.*, A **15** 346; etc.] and the fact that it is not transmissible through soil or knife cut, and very briefly records the results of experiments carried out in the Philippines from December 1931 to February 1933 with a view to finding an insect vector. These experiments are dealt with at length in the second paper.

The tests were conducted under carefully controlled conditions in specially constructed insect-proof chambers. Adults of the Delphacid, *Perkinsiella vastatrix*, Bred., transferred by means of an aspirator from infected canes (POJ 2878) to healthy, potted cane plants grown from one-node cuttings transmitted Fiji disease, which appeared after an incubation period of from 28 to 86 days. The injury caused by adults from healthy canes [*cf.* **16** 249] was quite distinct from the disease, the first symptoms of which in these experiments was the appearance of very small galls on any part of the lower surface of the leaves and mid-ribs, followed two or three weeks later by shortening of the leaves.

P. saccharicida, Kirk., the vector of Fiji disease in Queensland [**21** 520], does not occur in the Philippines.

IMAI (Y.). **Studies on the Transmission of Broad Bean Mosaic.**—*Trans. Sapporo nat. Hist. Soc.* **13** pt. 3 pp. 241–245, 5 refs. Sapporo, June 1934.

In experiments carried out in 1932 in Japan, a mosaic disease of broad beans [*Vicia faba*], the symptoms of which are described, was transmitted in one day's feeding by *Aphis laburni*, Kalt., and less readily by *Macrosiphum* (*Acyrthosiphon*) *onobrychis*, Boy. (*pisi*, Kalt.) and *Myzus* (*Rhopalosiphum*) *persicae*, Sulz. [*cf. R.A.E.*, A **22** 219, etc.]. *A. laburni*, which multiplies most readily on broad beans, and *M. onobrychis* were found on this food-plant in the field; *M. persicae* migrated to it from tobacco in the greenhouse. Some plants infested with virus-infected Aphids did not contract the disease. Broad bean

mosaic was transmitted to peas, sweet peas [*Lathyrus odoratus*] and beans [*Phaseolus vulgaris*] by *A. laburni*, and to sweet peas by *M. onobrychis*. *A. laburni* failed to transmit the disease to lucerne, Adzuki beans [*P. angularis*] or soy beans.

The incubation period of the virus in the plant was generally 6–10 days, but occasionally as long as 3–4 weeks ; that in the insect carrier seemed to be very short. The parthenogenetically produced offspring of infected Aphids did not transmit the disease. It was successfully transmitted to healthy broad bean plants by needle inoculation [*cf.* **17** 680], but attempts to infect young plants with the juice of crushed virus-infected Aphids gave negative results.

KUWAYAMA (S.). **On the Life-History of two Species of Leptocerid Caddis-flies injurious to the Rice Plant.**—*Trans. Sapporo nat. Hist. Soc.* **13** pt. 3 pp. 266–274, 4 figs., 9 refs. Sapporo, June 1934.

Serious damage has been caused to rice-fields in Japan by certain species of Leptocerids [*cf. R.A.E.*, A **19** 142], which are usually considered to be beneficial insects controlling aquatic weeds and providing food for fish. A preliminary note is given on the bionomics of two of these, all stages being described. *Setodes argentata*, Mats., overwinters as a larva in a case hidden beneath the roots of rice plants and weeds, or just below the surface of banks between rice-fields. About the middle of May (in Hokkaido), the larvae begin to feed on the young rice shoots and particularly on the roots, being most active in the daytime in calm, warm weather. Some larvae begin to pupate in the middle of June, but others continue feeding into July. The pupal case is attached to the submerged stem of a rice plant by silk. The pupal stage lasts 7–10 days, and adult emergence begins at the end of June and continues until September, the maximum occurring in July. The adults, which are present in large numbers among bushes and trees bordering infested rice-fields, are easily attracted to lights in the evening. The eggs are laid in masses sometimes containing over 100 on the surface of the water, subsequently dropping to the bottom as the jelly in which they are enveloped swells. The larvae hatch in about 2 weeks and form round themselves cases made of minute grains of sand mixed with silk. They do not injure the plants till after hibernation.

The habits and seasonal history of *Oecetis nigropunctata*, Ulmer, which occurs also in Korea, are similar, the two species being always found in association in Hokkaido. The eggs are deposited in masses of as many as 300. The larvae hatch in 1–2 weeks and live in the water, feeding on plant débris until half-grown.

Data are given of the numbers of adults of both species taken at light-traps from 1925 to 1929 between June and September. Rice plants directly sown in lowland fields are usually injured by the larvae, whereas young shoots in the seed-beds or plants transplanted from them are entirely immune.

MORETTI (G. P.). **I Tricotteri delle risaie.** [The Trichoptera of Rice-fields.]—*Atti Soc. ital. Sci. nat.* **73** pp. 93–145, 12 figs., 2 pls., 11 refs. Milan, 1934.

This monograph comprises a review of the literature on the Trichoptera found in rice-fields in northern Italy with original observations on their bionomics, and descriptions of all stages. Of the species previously recorded, *Phryganea striata*, L., the larvae of which are mainly

carnivorous, and *Limnophilus flavicornis*, F., and *L. rhombicus*, L., which occur only in permanently flooded fields, where material more suitable than rice is available for making the larval cases, appear to cause little injury. *Triaenodes bicolor*, Curt., however, is a serious pest in both permanently and intermittently flooded rice-fields. The larvae enter with the water from the ditches and feed on the young rice in the absence of the aquatic plants that they prefer. They reach the final (fifth) instar early in May, when the young rice is still quite small and tender, so that it furnishes the material almost exclusively used for the larval cases of this generation. The pupal stage, in a case attached to a submerged stem, lasts 10–15 days. The adults appear towards the end of May and oviposit on the leaves of various aquatic plants. Adults of the summer generation appear in August and lay the eggs from which the overwintering larvae hatch. Those that remain in pools in the rice-fields are destroyed by spring ploughing. Breeding also continues throughout the summer in the ditches, as in the permanently flooded fields. The only natural enemies that might control the larvae are fish, especially carp.

The life-cycle of *Oecetis furva*, Ramb., a species apparently not previously recorded from Italy, is somewhat similar to that of *T. bicolor*, but as the larvae are predominantly carnivorous, they are not appreciably harmful to rice, even in permanently flooded fields, where they are more abundant than in the others. The larvae of *Anabolia lombarda*, Ris., *Halesus digitatus*, Schr., and *H. tessellatus*, Ramb., are herbivorous, but they are not found in permanently flooded fields and are not harmful to rice.

KUNIKE (G.). **Das Verhalten des Kornkäfers in verschiedenen Stoffen.** [The Behaviour of the Grain Weevil in various Substances.]—*Anz. Schädlingsk.* **10** no. 7 pp. 75–79. Berlin, July, 1934.

The author describes a method of comparing the toxicity of various insecticides by observations on adults of *Calandra granaria*, L., immersed in aqueous solutions of them. In a preliminary experiment, about 30–40 thousand weevils were placed in a glass containing tap water, and every day 2–3 thousand of them were removed and dried. At 16°C. [60·8°F.], weevils immersed for 1 day revived in 10–60 minutes and the mortality was below 1 per cent.; after 14 days, they revived in 1–4 and the mortality was below 64 per cent. At 4°C. [39·2°F.], 5 per cent. revived after 45 days' immersion. At 30°C. [86°F.], 100 per cent. mortality was reached in 6 days. The oxygen required for metabolism was provided by the body tissues, as proved by the carbon dioxide given off to the water.

Solutions of various substances in water nearly always produced death more quickly than pure water. This was found to be due less to the osmotic pressure of the solution than to the penetration of the dissolved substance into the body. Thus immersion provides a standard for gauging toxicity that excludes such sources of error as humidity, food, or ingestion of amounts of poison difficult to determine.

Tables are given showing the mortality after immersion in various solutions for varying periods. For instance, a 1 per cent. solution of potassium arsenite resulted in mortalities of 97·1, 99·5 and 100 per cent. after 1, 2 and 3 days, as compared with 0·1 per cent. for water for all three periods. A mortality of 100 per cent. resulted after 1 minute in

undiluted xylol, pyridine or petroleum of 0·84 specific gravity, while 2 hours were required with carbon tetrachloride, 3 with acetone, 6 with absolute alcohol and 10 with petroleum ether. Of weevils kept at room temperature in various gases (air, oxygen, nitrogen and carbon dioxide), only those exposed for a long time to CO_2 were noticeably injured.

Subklew (W.). **Eine neue Zucht- und Versuchsanlage für Bodenschädlinge.** [A new Device for the Breeding and Study of Soil Pests.]—*Anz. Schädlingsk.* **10** no. 7 pp. 83–85, 2 figs., 2 refs. Berlin, July 1934.

For breeding wireworms and for experiments with them at Kiel (Schleswig-Holstein), a trench about 65 ft. long and 11 ft. wide is dug to a depth of 16 inches. It is then filled with two rows each of 18 concrete compartments (the tops of which are just above ground-level) except for a passage-way between them. The width of this passage is 4 ft. between the breeding compartments and $3\frac{1}{4}$ ft. between the experimental ones. A hinged, glazed cover is fitted to each compartment, and the side facing the passage is a sliding wooden panel permitting of easy inspection.

Mayer (K.). **Beitrag zur Kenntnis von Fosfolon als Schädlingsbekämpfungsmittel.** [A Contribution to the Knowledge of Fosfolon as a Fumigant.]—*Z. GesundhTech. Städtehyg.* **26** no. 7 pp. 377–384, 1 fig., 3 refs. Berlin, July 1934.

In laboratory experiments with Fosfolon [*cf. R.A.E.*, A **21** 388] in Germany a chamber of about 17 cu. ft. capacity and a glass bell of about 8 gals. were used, and in the field a cubical cover of about 27 cu. ft. capacity, made of oiled paper on a wooden framework. The powder was strewn on paper or on dishes and thus exposed to the air and to soil moisture previously increased by watering. Any direct addition of water to Fosfolon is dangerous, owing to its highly inflammable and explosive nature, and for continuous work a gas-mask is necessary.

In the field, Aphids on beans, beet, etc., and *Psylla mali*, Schm., on apple twigs were killed in 24 hours by a dose of 11 oz. per 100 cu. ft., whereas nymphs of *Aphis sambuci*, L., required 48 hours. In the laboratory, the larvae of *Nygmia phaeorrhoea*, Don., and the adults of *Melolontha melolontha*, L. (*vulgaris*, F.), *Anthonomus pomorum*, L., and *Tribolium confusum*, Duv., were killed in 24 hours by 1–2 oz. per 100 cu. ft., and *Tachycines asynamorus*, Adel., by 2–4 oz. Against *Calandra granaria*, L., an exposure of 48 hours was necessary with 1 oz. per 100 cu. ft. Ants (*Tetramorium* sp.) were not affected when their nests were fumigated even with $3\frac{1}{2}$ oz. per nest. Seeds and plants were not affected by doses lethal to their pests, and serious injury, of which the first symptom was yellowing of the foliage, was only caused by large doses such as 16 oz. per 100 cu. ft.

Ripper (W.). **Die feldmässige Bekämpfung der Rübenblattlaus.** [The Control of heavy Infestations of the Beet Leaf Aphis.] —*Neuheiten PflSch.* **27** no. 3 pp. 55–58. Vienna, July 1934.

A mass infestation of beet by *Aphis* (*Doralis*) *fabae*, Scop., occurred in May 1934 in the Marchfeld area, Austria, about half the plants being

attacked in some fields. *Coccinella septempunctata*, L., Syrphid larvae and *Lysiphlebus dissolutus*, Nees, failed to check it, and the customary measure of picking infested leaves proved quite inadequate. Complete control was obtained on a small scale by a spray containing 2 per cent. soft soap and 1 per cent. spirit, and in large areas by a dust of nicotine sulphate with an inert carrier (1 : 19) applied at the rate of 124 lb. per acre.

Schellenberg (A.). **Beobachtungen in der Bekämpfung von Heu- und Sauerwurm im Kanton Zürich.** [Observations in the Control of the Vine Moths in the Canton of Zürich.]—*Schweiz. Z. Obst-u. Weinbau*, 1933, no. 9, p. 143. (Abstr. in *Neuheiten PflSch.* **27** no. 3 p. 67. Vienna, July 1934.)

In the Canton of Zürich, Switzerland, glass bait-traps [*cf. R.A.E.*, A **19** 157 ; **20** 50] are reliable indicators of the necessity for spraying with lead arsenate against the spring generation and with nicotine against the summer generations of *Clysia ambiguella*, Hb., and *Polychrosis botrana*, Schiff., on vines [*cf.* **18** 604]. The sprays should be applied 10–14 days after the maximum spring flight and 8–10 after the maximum summer one. The Austrian abstractor points out that the intervals should be shorter in Austria.

Bua (G.). **I fattori meteorologici e la mosca dell'olivo.** [Meteorological Factors and the Olive Fly.]—*Meteorol. prat.* **15** no. 3 reprint 12 pp., 2 figs., 6 refs. Perugia, 1934.

The relation of rainfall and mean monthly temperatures to the abundance and injuriousness of the olive fly, *Dacus oleae*, Gmel., was investigated near Salerno in 1931–33. The intensity of the injury was gauged by counts of the flies captured in bait-pans and of the olives injured and the punctures in them. The threshold of development was found to be 9·3°C. [48·74°F.], and the thermal constant 338·1 day-degrees C. [608·58 F.]. Infestation in summer was heaviest when rainy days were most numerous and evenly distributed. In July, mean temperatures above 24°C. [75·2°F.] were at any rate indirectly unfavourable by retarding the development of the fruits so that the larvae in them died. In regions where the mean winter temperatures rarely fall below 9·3°C., the effect of a series of favourable summers is cumulative.

The percentage of larval parasitism was lowest in 1933, a year of frequent rain and heavy infestation. It was always highest in the earlier part of the season, considerably reducing the numbers of the first two or three generations.

Goidanich (A.). **Materiali per lo studio degli Imenotteri Braconidi III.**—*Boll. Lab. Ent. Bologna* **6** pp. 246–261, 2 figs., 31 refs. Bologna, 30th May 1934.

In this paper [*cf. R.A.E.*, A **22** 354], the author discusses the status of *Habrobracon*, which he considers a distinct genus, and describes the four species that have been recorded from Italy, viz. : *Microbracon* (*H.*) *genuensis*, Marshall, from *Eucosma* (*Tmetocera*) *ocellana*, Schiff., infesting hazel [**11** 516] ; *M.* (*H.*) *brevicornis*, Wesm., from *Pyrausta*

nubilalis, Hb., *Polychrosis botrana*, Schiff., and probably other Lepidoptera; *M.* (*H.*) *hebetor*, Say (of which *Bracon breviantennatus*, De Stefani, described in 1919 from *Corcyra cephalonica*, Stn., infesting rice in Sicily is a synonym) from various Lepidoptera; and possibly *M.* (*H.*) *crassicornis*, Thoms., which is doubtfully recorded from Italy. *M.* (*H.*) *hebetor tortricidarum*, f. n., is described here from the larvae of *Cnephasia wahlbomiana*, L., rolling the leaves of maize near Bologna. A key to these species is appended, showing their synonymy and distribution in Italy.

PUSSARD (R.). **Les parasites animaux et végétaux de l'oeillet; leur traitement.**—*Eclair. agric. hort.* **13** no. 52 pp. 494–500, 4 figs. Nice, 1st December 1933. [Recd. July 1934.]

Insects attacking the roots of carnation (*Dianthus caryophyllus*) grown under glass in southern France include wireworms, *Gryllotalpa gryllotalpa*, L., and the larvae of the Tenebrionid, *Opatrum sabulosum*, L., and of the Prionid, *Vesperus strepens*, F. Good control of the latter was obtained by watering the soil with a 2 per cent. solution of potassium sulphocarbonate. The use of barium fluosilicate in poison-baits against *Gryllotalpa* is advocated instead of zinc phosphide [*cf. R.A.E.*, A **20** 257], in view of the high toxicity of the latter to man.

The stems are attacked by *Hylemyia cardui*, Mg., and *H. brunnescens*, Zett. [*cf.* **20** 578]. *H. cardui* deposits its eggs singly on young plants or slips at the leaf-axils, and the larva penetrates into the stem, on the pith of which it feeds, and then makes its way into the leaf from the base, eating out the parenchyma. Later it descends to the base and penetrates into another leaf. Infested leaves turn white, but do not wither. Pupation takes place in the stem, or in the soil at the foot of the plant. The only effective measures against this Anthomyiid and *H. brunnescens* [*cf.* **19** 2] are the removal and burning of all infested plants and the breaking up of the soil.

Myzus persicae, Sulz., on the stems and leaves can be effectively controlled by sprays of nicotine sulphate and soap, with the addition of a little ox gall, and *Tetranychus telarius*, L., on the leaves by greenhouse fumigation with naphthalene [**16** 338; **17** 187] or with nicotine (by allowing a titrated solution to evaporate on a stove) or by nicotine sulphate-soap sprays. The measures advocated against *Hypera arator*, L., which occurs in warm and moist places, oviposition lasting from the beginning of May till mid-October, have already been noticed [**17** 410]. *Tortrix pronubana*, Hb. [*cf.* **15** 277; **17** 18] lays its eggs in batches of 30–80 anywhere in greenhouses, and the larvae hatch in about 15 days. Four generations develop, in March–April, May–June, July–August and September–October respectively. For control, infested plants should be pulled out and burnt and the remainder sprayed with nicotine. The author believes that the application of dusts containing barium fluosilicate and talc, to which sulphur, nicotine or pyrethrum may be added, is more advisable than the use of arsenical sprays [*cf.* **12** 561].

Taeniothrips vulgatissimus, Hal. (*Physopus pallipennis*, Uzel) and *Thrips tabaci*, Lind. (*communis*, Uzel) may be destroyed by applications of nicotine sprays throughout the summer at intervals of 8 days [*cf.* **12** 253; **13** 165; **20** 483]. All the first flowers that are pinched out should be immediately burnt, as well as all the plants discarded at the end of the season.

HARDOUIN (R.). **Un Acarien très nuisible à l'horticulture** *Tetranychus ludeni* **Zacher.**—*Bull. Soc. ent. Fr.* **39** no. 8 pp. 123–125, 2 figs., 2 refs. Paris, 1934.

Tetranychus ludeni, Zach., was found attacking geranium (*Pelargonium*) in greenhouses and forcing frames on the outskirts of Paris, causing the leaves to dry up and killing the plants. Only one adult occurred on the lower surface of each infested leaf. The development of a generation appeared to be completed in about 12 days. Its food-plants include also *Salvia splendens*, arum, *Lobelia erinus*, *Celosia cristata*, *Viola cornuta*, cultivated carnations and especially *Ageratum*, great losses being thus caused annually to horticulturists in the western part of Paris. Effective remedial measures, such as fumigation of greenhouses with tobacco or the application of nicotine, are too expensive, but it has been demonstrated in practice that repeated watering will check the development of the mite without injuring the plants.

MESNIL (L.). *Ophiomyia pinguis* **Fall. (Dipt. Agromyzidae) nuisible aux endives.**—*Bull. Soc. ent. Fr.* **39** no. 9 pp. 131–136, 3 figs., 5 refs. Paris, 1934.

Ophiomyia pinguis, Fall., which has not previously been recorded from France, was discovered attacking chicory (*Cichorium intybus*) cultivated in that country, about 50 per cent. of the plants examined by the author being infested. A detailed description of the larva is given. It has not been ascertained whether there is one generation a year, or two. The author, disagreeing with van den Bruel [*R.A.E.*, A **21** 215], believes that the plants become infested during summer in the field, as there is not time for the life-cycle of this Agromyzid to be completed while they are in the forcing-beds in winter, and the larvae found in the forced plants (which are eaten as vegetables) are always full-grown. The adults lay their eggs in the petioles, and the larvae mine long, sinuous galleries across the central part of the plant, descending to the root collar as soon as the weather becomes cold. In November, when the leaves are cut away in preparation for forcing, a certain number of the larvae remain at the base of the petioles, which soon rot in the forcing-bed ; they then migrate to the central part by mining sinuous tunnels 2–3 mm. wide. Pupation takes place in the leaf tissue. The adults emerge during April, and the females oviposit on young chicory seedlings (which are usually sown early in May) and perhaps on various wild Compositae.

It is suggested that the leaves should be cut shorter than is usually done before forcing, and perhaps that repellents should be applied to the plants in the field in order to prevent oviposition.

ANDRÉ (M.). **Acariens (Thrombidions) prédateurs ennemis du doryphore.**—*Bull. Soc. ent. Fr.* **39** no. 11 pp. 175–176, 1 ref. Paris, 1934.

Of four Trombidiid mites collected at the end of May 1934 in Haute Vienne (central France) and believed to have fed on the eggs of *Leptinotarsa decemlineata*, Say, on potato, three were identified as *Sericothrombium holosericeum*, L., and one as *S. latum*, C. L. Koch.

Réglementation de l'emploi des insecticides classés parmi les substances vénéneuses.—*Rev. Zool. agric.* **33** no. 3 pp. 35–42. Bordeaux, March 1934. [Recd. July 1934.]

The text is given verbatim of the French legislation of 1916, 1928 and 1933 regulating the sale and use of arsenicals against various pests (chiefly of vegetables and fruit trees) and of zinc phosphide in poison-baits against *Gryllotalpa gryllotalpa*, L.

Zones de protection établies contre les progrès du doryphore.—*Rev. Zool. agric.* **33** no. 3 pp. 42–46. Bordeaux, March 1934. [Recd. July 1934.]

A list is given of the cantons in France that lie wholly or in part within the protective zones [*cf. R.A.E.*, A **21** 398 ; **22** 434] established against the spread of the Colorado potato beetle [*Leptinotarsa decemlineata*, Say].

Pussard (R.). **Les principaux insectes ravageurs des cultures fruitières.**—*Rapp. Congr. Agric. Nice 1934* reprint 11 pp., 3 figs., 1 ref. Nice, Soc. centr. Agric., 1934.

A brief account is given from the literature of the bionomics and control of the following principal insect pests of fruit trees in southern France ; various Coccids and Aphids ; *Anthonomus pyri*, Boh., on pear ; *Cydia* (*Laspeyresia*) *pomonella*, L., on apple and pear ; *Ceratitis capitata*, Wied. ; *Cydia* (*Laspeyresia*) *molesta*, Busck, on peach ; and *Capnodis tenebrionis*, L., on peach, apricot and plum. The only measures the author considers to be effective against the last-named are the planting of healthy trees and regular hand-collection of the adults [*cf. R.A.E.*, A **12** 559 ; **19** 625].

Davies (C.) & Smyth-Homewood (G. R. B.). **Investigations on Machinery used in Spraying. Part I. Nozzles.**—*J. S.-E. agric. Coll. Wye* **34** pp. 39–62, 16 figs., 4 refs. Wye, Kent, July 1934.

A comprehensive scheme has been drawn up for the improvement of the mechanical apparatus for the application of liquids and dusts against insects and fungi on fruit trees. This first report deals with investigations carried out in the laboratory on the types of nozzles used in spraying. The patterns produced, when the various nozzles (with different settings) were held stationary over the object to be treated for $\frac{1}{20}$ sec. or when they were moved from side to side, are discussed and illustrated. The output of the nozzles, the effect of back pressure on the quantities of spray ejected and the distance over which adequate coverage may be obtained are dealt with. It is probable that specially designed nozzles should be used for high-pressure spraying.

Jary (S. G.). **A Note on Injury caused by two Species of Thysanoptera.**—*J. S.-E. agric. Coll. Wye* **34** pp. 63–64. Wye, Kent, July 1934.

The germination of brussels sprouts in a seed-bed in Kent during 1934 was considerably delayed by *Thrips angusticeps*, Uzel. Large numbers of the thrips were found in April in the cavities formed by the curled edges of the dwarfed and thickened cotyledons of the few seedlings that did appear. These showed typical feeding punctures ; injury to the growing-point was sufficiently severe to inhibit normal

development. The leaves of *Rumex* sp. in the same field were somewhat curled. The damage was apparently caused by the nymphs, which had developed in large numbers on mustard, the preceding crop, at the end of the previous summer and overwintered in the soil.

Slight malformation and striped colouring of apple blossoms in the full pink-bud stage was found in May to be due to large numbers of *Taeniothrips inconsequens*, Uzel, which caused sufficiently severe injury to the bases of the petals, stamens and styles to interfere with the normal setting of the fruit. Breeding was apparently taking place, as eggs from which nymphs (almost certainly of this species) hatched were discovered in the blossom-stalks and larger leaf-veins. It appears that this thrips may be of some economic importance in England in certain seasons, and that it may be associated with poor setting of the fruit due to injury to the unopened buds.

JARY (S. G.). **Insect Pests and the Weather in 1933.**—*J. S.-E. agric. Coll. Wye* **34** pp. 65–69, 8 refs. Wye, Kent, July 1934.

The occurrence of insect pests at Wye, Kent, is discussed in relation to the weather, a summary being given of the conditions prevailing from January to September 1933, the rainfall having been normal until August. The reproduction of *Aphis pomi*, DeG., *Anuraphis roseus*, Baker, *A. padi*, L. (*helichrysi*, Kalt.) and *Rhopalosiphum prunifoliae*, Fitch, which were comparatively scarce on fruit trees, was adversely affected by cold winds and a period of subnormal sunshine and excessive rainfall with a few days of high temperature during April–May. These Aphids became very rare, except on trees in sheltered positions. On the other hand, *Eriosoma lanigerum*, Hsm., was active early in the year and was abnormally abundant in May. During the hot weather in July, however, the colonies showed no signs of increasing and even became smaller, though they usually begin to become common at this time. It appears from observations made on a small scale that this Aphid flourishes best in shaded situations, for colonies were found only on suckers arising at or near the base of the trees or on the lower surface of the branches, usually on the side protected from direct sunlight. Moreover, there is some evidence that infestations are more serious and persistent where the trees are crowded and inadequately thinned. It is not, however, suggested that spells of unbroken sunshine and drought will influence it to any great extent, as not much of the wood ever receives the direct rays of the sun for any long period. Certain other Aphids were observed from May onwards: *Aphis rumicis*, L., was common but not abundant on beans and many plants, and periodic rains in June appeared to prevent the development of colonies, which dwindled until only a few stragglers were present in July; *Macrosiphum carnosum*, Buckt. (*urticae*, Schr.) and *M. onobrychis*, Boy. (*pisi*, Kalt.) were abundant, the former being eradicated in mid-June by a fungus, whereas the latter was one of the most injurious Aphids of the year, especially on peas; *M. rubiellum*, Theo., was very prevalent on cultivated blackberries until late in the summer.

The first and second generations of *Pieris brassicae*, L., and *P. rapae*, L., were abnormally large, and very severe damage to cabbage, etc., was anticipated. However, few eggs could be found; those of *P. rapae* were commoner, but either they did not hatch or the young larvae succumbed early. The hibernating adults of *Anthonomus pomorum*, L., and *A. rubi*, Hbst., did not appear to be affected by snow

and temperatures below 12° F. in January and February, for they were both very common. *Rhynchites aequatus*, L., *R. coeruleus*, DeG., *Otiorrhynchus sulcatus*, F., and *O. singularis*, L., were also abundant, either owing to the production of unusually large numbers during the previous year or to an abnormally low winter mortality. *Tetranychus telarius*, L., on hops is believed to be checked by moist conditions during summer. As the rain in 1933 fell mainly in heavy showers with prolonged periods of hot sunshine between, the soil itself did not remain particularly moist. The mite was not noticeable until the onset of the drought in August, when the numbers increased enormously and culminated in an outbreak in a few weeks. Hills of one particularly susceptible variety of hops near an overhead water tank, from which there was a slight overflow, were practically free from infestation over a distance of about 6 yards, the intensity of attack increasing with the distance from the tank.

AUSTIN (M. D.) & JARY (S. G.). **Investigations on the Insect and allied Pests of cultivated Mushrooms. II and III.**—*J. S.-E. agric. coll. Wye* **34** pp. 70–86, 2 pls., 9 refs. Wye, Kent, July 1934.

The biology of *Sciara umbratica*, Zett., which has recently been included among the Mycetophilid pests of mushrooms in Britain [*R.A.E.*, A **21** 397], appears to be similar to that of *S. fenestralis*, Zett. [**21** 489], but the larvae were occasionally observed to work downwards from the cap, on which the eggs were probably laid, and to make their way into the gills, the points of entrance developing into large holes or cracks on the caps. The mycelium is probably attacked by the larvae of *Sciara* spp. when they are present throughout the entire depth of the beds or when they chance upon it, especially if it is round the bases of the developing buttons, which may in consequence appear brown and stunted. However, the rearing of several successive generations of *S. fenestralis* on sterilised manure alone [*cf.* **22** 233] indicated that mycelium is not necessary for normal development. This species and *S. auripila*, Winn., have been recorded from January to October, and attack may occur at any time in heated houses. Pupae of *S. fenestralis* placed in glass containers at a depth of about 3 ins. in the soil (which, though not artificially compacted, was not loose) gave rise to adults that paired in the larger air spaces and oviposited without coming above the surface. This may explain the occasional failure to control infestations with nicotine. It is unlikely, however, that very large spaces occur in the soil and manure under commercial conditions; moreover, the flies are usually attracted to light, which they received in the laboratory through the sides of the container.

The commonest Phorid is *Megaselia* (*Aphiochaeta*) *albidihalteris*, Felt [**22** 233], which bores in the stalks and caps in a manner similar to *Sciara*. Attacks occur mainly in summer, when they may be extremely severe, causing a more or less complete failure of the beds owing to the destruction of the mycelium and the riddling of the small buttons. The adults are often common round manure heaps and have been taken in mushroom houses in February. The larvae of Cecidomyiids [**21** 397] frequently occur in patches on the beds during winter, when they may congregate on the stalks and gills of the mushrooms. They usually appear after watering. They become partly buried in the skin, which appears streaked, and the presence of large numbers lowers the value of the crop. The larvae reproduce by paedogenesis [*cf.* **16** 615].

Pupation has been induced by allowing the cages to become partly dry, and the few adults thus obtained have been identified as *Mycophila* sp. *M. speyeri*, Barnes, has been previously recorded as attacking mycelium in Britain [*cf.* **15** 62], and this type of injury may explain the poor cropping of infested beds. It appears that these flies may compose part of the population of rotting straw, as many similar larvae can frequently be found on decaying leaves and straw of cereals. Shallow pits may be eaten in the stalks and the edges of the caps of mushrooms frayed by Collembola, of which *Hypogastrura armata*, Nic., and its var. *inermis*, Axels. [**21** 110] are known to be injurious. More serious damage was caused in one glasshouse, where the few buttons that grew as high as $\frac{1}{2}$–$\frac{3}{4}$ in. became dry and spongy owing to the number of tunnels, the oval, sunken openings to which generally occurred low down on the stalk or on the cap. It was doubtful whether the mycelium had been damaged.

Caloglyphus krameri, Berl., is the commonest mite. *Tyroglyphus mycophagus*, Megn. [**22** 233; etc.] and *Oppia nitens*, Koch, have not yet been recorded with certainty. Mites usually infest the beds as soon as or just after they have begun to crop; the first buttons, consequently, bear deep pits all over the stalks and caps, and the very small ones become hollow and dark brown where the mites have entered through the stalk. *C. krameri* may oviposit in such situations. In heavy infestations, most of the crop is ruined in the button stage and only a very small proportion is harvestable; moreover, there is evidence that the mycelium is also damaged. If, as appears probable, these mites are a normal part of the fauna of manure, the 2–3 months that elapse between the making of the beds and cropping may permit them to increase to the huge numbers present in heavy infestations.

A list is given of the Arthropods taken in samples collected from two heaps of stable manure in the process of composting. Only single examples of two known mushroom pests were recovered, a Phorid and a Mycetophilid. It is therefore tolerably certain that the compost was free from infestation by the usual pests up to the time of the construction of the beds. Infestation might possibly occur during the intervals between the putting down of the beds and the application of the casing soil (during which time spawning takes place) [*cf.* **22** 233], or between casing and the beginning of cropping. Alternative possibilities are that the fauna of the manure examined may have been influenced by the conditions on the particular farm, where it is stored under cover and for short periods only; that the local infestation of manure may be low normally (though this appears improbable, as heavy attacks of *M. albidihalteris* and slight infestation by *Sciara* have been observed); or that compost made at this time of year (October–December) is not usually infested, as beds made from manure composted in late autumn and winter for early cropping in the following year are not heavily infested as a rule.

STAPLEY (J. H.). **The Apple Fruit Miner** (*Argyresthia conjugella* **Zell.**). —*J. S.-E. agric. Coll. Wye* **34** pp. 87–92, 10 figs., 6 refs. Wye, Kent, July 1934.

Observations were carried out during 1932–34 on *Argyresthia conjugella*, Zell., which was causing considerable damage in an orchard in Kent. This Tineid is apparently well distributed throughout Great Britain and Northern Ireland, but has not previously been recorded as a

primary pest in any of the important fruit-growing districts. The stages are briefly discribed. In 1933, moths were seen round mountain ash, *Pyrus* (*Sorbus*) *aucuparia*, the normal food-plant, from 30th May to 6th July, being particularly numerous on 14th June. Eggs were found between 8th and 24th June deposited singly on the berries and also in small numbers on apples. In the laboratory, individual females laid about 25 eggs on a single apple, of which as many as 40 per cent. sometimes failed to hatch. The larvae, which hatch in 13 days, feed for about 6 weeks or sometimes longer within the fruit, first in shallow pits beneath the points of entrance, which appear on mature fruit as sunken discoloured patches in the centre of which are white glistening lumps of crystallised juice, and then in mines, which penetrate the flesh in all directions. A larva may attack the pips on reaching the core [*cf. R.A.E.*, A **14** 111]. Attack by the larvae commences after spraying against other apple miners is completed and therefore remains unobserved until harvest. In the laboratory in 1932, the pupal period, which began in mid-August though larvae were still present in the fruit in mid-October, was passed in cocoons in the soil at a depth of 1–2 ins. or occasionally among dead leaves and stones on the surface. There was a prepupal period of 2–3 days.

The distribution of *A. conjugella* follows closely that of mountain ash, which has always been found in the vicinity of infested apples. The moth is a weak flier and apparently does not travel far. Severe damage has been observed to occur on apple trees in alternate years, confirming the theory that this Tineid migrates to orchards when the numbers of mountain ash berries available are insufficient [**16** 236 and *loc. cit.*]. In the laboratory, some larvae that pupated in 1932 did not emerge in 1933, though they were still viable. It is possible, therefore, that some pupae may undergo a diapause for 2 years, which would explain the relative abundance of adults every other year and the consequent infestation of apples in the year of greater emergence.

A light dusting of derris in the laboratory killed the larvae as they hatched and may have affected some of the eggs. Where eggs were sprayed with an emulsion of cotton-seed oil and soap, most of them hatched and more than half the larvae burrowed into the fruit.

AUSTIN (M. D.), JARY (S. G.) & MARTIN (H.). **Studies on the Ovicidal Action of Winter Washes—1933 Trials.**—*J. S.-E. agric. Coll. Wye* **34** pp. 114–135, 3 figs., 6 refs. Wye, Kent, July 1934.

In further studies in England on the relation between the ovicidal properties of tar and petroleum oils in dormant sprays and their physical and chemical characteristics [*cf. R.A.E.*, A **21** 490], the oils employed included those used in the previous year, but the oil content was reduced to 4 or 2 per cent., in view of the high mortality then obtained with 5 per cent.

The following is taken from the authors' summary: No difference in action was noticed on eggs of *Lygus pabulinus*, L., laid in twigs of two different varieties of red currant. No relation was found between ovicidal properties and the characteristics of 21 petroleum oils of paraffinic, asphaltic, naphthenic and Western bases, of viscosities ranging from 126″ to 800″ Redwood 1 at 70°F. and of unsulphonated residues ranging from 60 to 100 per cent. by volume. The removal of tar acids [*cf.* **22** 323] and bases improved the efficiency of a tar oil, but the removal of oxygenated derivatives produced an oil of less value

than a half-white petroleum oil of similar boiling range. Evidence was obtained of the lower ovicidal efficiency of petroleum oils of unsulphonated residue below 60 per cent. by volume, and it is suggested that the inferiority of tar oils to the petroleum oils tested is associated (apart from the lower hydrocarbon content and boiling range) with the chemical character of the hydrocarbons present. There were variations in the efficiency of the various petroleum oils examined at 4 and 2 per cent. unrelated to the characteristics of the oils determined.

Field trials showed the two-solution method of emulsification with oleic acid and sodium hydroxide (0·6 and 0·1 per cent. by volume) [*cf.* **19** 612] to be suitable for the preparation by the grower of washes containing tar and petroleum oils of specified characteristics. Home-prepared washes containing 3 per cent. strained anthracene oil and 4·5 per cent. of any one of four petroleum oils of different characteristics were as satisfactory against *L. pabulinus* on red currants as a wash containing 4 per cent. tar oil and 6 per cent. petroleum oil, but generally less satisfactory on black currants. They were also generally inferior against *Plesiocoris rugicollis*, Fall., on apples, but the 10 per cent. combined spray caused marked damage to the buds. A home-prepared wash containing 4 per cent. strained anthracene oil and a proprietary tar wash at 6 per cent. both gave excellent control of *Psylla mali*, Schm., on apple. The poor results obtained with two proprietary washes containing petroleum oil of low unsulphonated residue were found to be related to the low content of aromatic hydrocarbons in the prepared wash.

DAVIES (C.). **A Method to determine the Surface Area of Trees covered by Spray Fluid and to obtain a permanent Record of the Degree of Fineness of the Deposit.**—*J. S.-E. agric. Coll. Wye* **34** pp. 252–253, 1 pl. Wye, Kent, July 1934.

The following technique was evolved for estimating the amount of tree surface covered by sprays and the extent to which laboratory observations on the spray cones ejected by nozzles under various conditions [*R.A.E.*, A **22** 511] are reproduced in the field. A number of artificial leaves of transparent celluloid (2 ins. in diameter) are fixed with small spring clips at random in the tree. When they are collected, those having a visible covering of dry spray can be used as negatives and photographic prints taken from them for permanent record. The disks can then be washed and employed again. The density of the dried deposit may usually be increased by treating the disks with a substance that leaves no precipitate but combines with the chemicals already present ; for instance, those sprayed with lime-sulphur will show a clearer pattern after immersion for a few seconds in silver nitrate solution. It is sometimes necessary to determine if the disks collect the spray in the same way as the leaves ; if a difference is found, the disks may be coated with some transparent substance, such as oil.

ROLFE (S. W.). **Notes on Diplopoda III. Short Notes on three injurious Millipedes recently observed.**—*J. S.-E. agric. Coll. Wye* **34** pp. 258–259. Wye, Kent, July 1934.

A few small mushrooms from Sussex examined in April 1934 were found to contain over a dozen males and females of *Choneiulus palmatus*, Němec, which has rarely been recorded in England and apparently

never as a pest. Characters by which it may be distinguished from the commoner species of millepedes are briefly given.

The feeding of fairly large numbers of *Blaniulus guttulatus*, Bosc, between the cotyledons is believed to have been partly responsible for the patchy appearance of a crop of young peas in Kent. Seedlings that were about 3 ins. high in May were expected to outgrow any attack, though some of the millepedes were then still feeding on and boring into the cotyledons.

Cylindroiulus londinensis var. *coeruleocinctus*, Wood, was discovered in April among the roots (to a depth of about 3 ins.) of strawberry plants in Kent, where it is quite common. Though they probably killed a number of plants, the millepedes may only have attacked roots injured by treatment in hot water (immersion for 20 minutes in water at 110°F.), which had been carried out about 3 weeks previously.

Barnes (H. F.). **Sudden Outbreaks of Insect Pests**—*J. S.-E. agric. Coll. Wye* **34** pp. 260–268, 3 pls., 1 diagr. Wye, Kent, July 1934.

A brief outline is given of a method previously described of estimating the abundance of Cecidomyiids by the collection of samples of the crop and counting the numbers of injurious larvae present [*R.A.E.*, A **20** 484; **21** 368]. Data on the incidence and parasitism of *Contarinia tritici*, Kby., and *Sitodiplosis mosellana*, Géh., on wheat in a field in Hertfordshire for 1927–33 are given, and a table is presented of suggested rhythmic fluctuations for the period 1914–38, during which the maximum numbers occur about every 4 years.

A modification by C. B. Williams of his light-trap [*R.A.E.*, A **12** 474] is described, in which the insects collected during eight periods of the night fall respectively into eight different killing bottles, which are changed by means of a clockwork mechanism.

The means by which heavy outbreaks may be avoided are discussed, chief importance being assigned to cultural measures [*cf.* **22** 478]. The value of the choice of suitable environment for the plant is illustrated; work on the susceptibility of varieties of willow [*Salix*] to attack by Cecidomyiids [*cf.* **19** 274] is discussed; and reference is made to studies undertaken by H. C. F. Newton on the chemotropisms of insects in relation to their choice of food-plants.

Dharmarajulu (K.), Suryanarayana (M.), Gopala Menon (E. R.) & Margabandu (V.). **The Present Position of the Cotton Stem Weevil Problem.**—*Madras agric. J.* **22** no. 6 pp. 204–209, 2 refs. Coimbatore, June 1934.

Since it was first noticed in Coimbatore on Cambodia cotton, *Pempheres affinis*, Fst. (cotton stem weevil) has spread to almost every cotton area in the Madras Presidency and to all varieties of cotton. The life-history as observed during the last two seasons was largely similar to that previously described [*R.A.E.*, A **7** 114; **11** 465]. The weevil oviposits in a cavity made by preference on the hypocotyl regions of the cotton plant and covers the egg with a gummy secretion. The young larva cuts through the medullary ray and tunnels round the stem along the cambium, taking a slanting, downward course and feeding on the soft portions. It then scoops out a pupal chamber in the wood, the adult emerging by cutting the bark at the other end. The plant often succumbs in consequence to mechanical disturbances such as high winds.

Two Chalcidoids have been observed parasitising the larvae. Field trials with earthing the plants up to the cotyledonary node, thus covering the non-hairy parts and leaving above ground only the hairy ones, gave some promise of control. Experiments are also being made to produce a Cambodia variety with a hairy hypocotyl. Close spacing appeared promising. As adults, pupae and larvae soon died when the plants were dried immediately, sun-drying would prevent emergence from the stalks. In the authors' experiments, the weevil only bred on cotton and occasionally on *Corchorus* (jute). By shortening the growing period of cotton so as to enable two early harvests to be gathered, a long close season could be observed that might starve out the weevil.

Plant Quarantine Import Restrictions of the Philippine Islands.—*B.P.Q. 363*, 10 pp. multigraph. Washington, D.C., Bur. Pl. Quar. U.S. Dep. Agric., 1st May 1934.

In addition to other Plant Pest Legislation in force in the Philippines [*R.A.E.*, A **21** 624], this summary of import restrictions now effective there gives the terms of the following Administrative Orders : Nos. 10 and 11 (19th March and 14th July 1932) restricting the import of *Musa* spp. (including banana), *Agave cantula*, sisal (*A. sisalana*), tobacco, pineapple, sugar-cane, coconut, rice, *Bambusa* sp. and certain varieties of *Citrus* ; and no. 56 (of 21st August 1928) prohibiting the import of fresh fruits from Texas and Mexico to prevent the introduction of *Anastrepha ludens*, Lw., into the Islands. Conditions governing the certificates that must accompany any consignments of such fruits, their inspection on arrival, disinfestation, etc., are specified, certain plant materials that may be admitted under specified conditions without permit are enumerated, and the authorised ports of entry are listed.

Uichanco (V. B.). **A Study of three Species of Philippine Derris.**—*Natural appl. Sci. Bull.* **3** no. 2 pp. 129–239, 1 map, 6 pls., many refs. Manila, October 1933.

The distribution in the Philippines of the 15 native species of *Derris* is shown in a table, and the results are given of a chemical examination of *D. philippinensis*, *D. elliptica* and an undetermined species referred to in a previous publication [*R.A.E.*, A **15** 16] as *D. polyantha*. From tests with *Toxoptera aurantii*, Boy., the insecticidal efficiency of the three species was estimated at about 31, 39 and 57 per cent., respectively. Experiments in the extraction of the toxic ingredients by various methods confirmed the superiority of the undetermined species. Information is given from the literature on the uses, cultivation, marketing and chemical constituents of *Derris* and its toxicity to numerous insects, and a bibliography (with subject index) is appended supplementary to that of Roark [**20** 440].

Fukuda (K.). **Studies on *Liburnia oryzae* Mats.** [*In Japanese.*]—*Bull. Govt Res. Inst. Formosa* no. 99, 19 pp., 1 pl. Taihoku, Formosa, July 1934.

In Formosa, 21 species of Homoptera are now known to attack rice, of which *Nephotettix bipunctatus*, F. (*apicalis*, Motsch.), *Erythroneura* (*Zygina*) *subrufa*, Melich., *Nilaparvata* (*Liburnia*) *oryzae*, Mats., and

Sogata (*L.*) *furcifera*, Horv., are the most important. Serious damage has been due to the two last-named species, which are usually scarce, but sometimes occur in abundance. Brief descriptions are given of all stages of *N. oryzae*, which also feeds on *Zizania latifolia* and other grasses and has 8 or 9 generations annually, all stages being found throughout the year. This Delphacid usually attacks the lower part of the rice plants, but may also infest the upper one as the plants grow. It is active at night, and the macropterous forms are attracted to light. The females of this form live 24·3 and the males 20·9 days ; for the brachypterous form, the periods are 27·3 and 19·3 days, respectively. The females begin to oviposit, especially in the lower leaf-sheaths, 3–7 days after the last moult, the number of eggs laid being 190·2 during 6–43 days with a maximum of 385 for the macropterous form, and 201·6 during 11–39 days with a maximum 412 for the brachypterous one. The incubation period is a little less than a week in July and August, and 36 or 37 days in January and February, about 88·6 per cent. of the eggs hatching. The nymphs reach the adult stage in about 13 days in July, and about 47 in January and February, moulting 5 times. The tender varieties of rice seem more susceptible to attack, and high temperatures and low rainfall seem to lead to an outbreak.

Petroleum oil, alone or with pyrethrum, is used for control in Formosa, and pyrethrum-soap sprays or tobacco dust may be recommended when irrigation is not available. Natural enemies include a Mymarid, *Anaphes* sp., which parasitises 47 per cent. of the eggs on an average in summer, completing one life-cycle in 10–12 days ; Trichogrammatids, *Aphelinoidea* sp. and *Trichogramma* sp., which parasitise about 7 per cent. ; and the predacious ant, *Tetramorium guineense*, F.

Shibata (K.). **Experimental Studies on the Influence of low Temperatures upon the Development of Paddy-borer** (*Schoenobius incertellus* **Wlk.). Second Report. Studies on the Freezing Point of Blood in the Winter Season, as well as on the Water-Content of Body.** [*In Japanese.*]—*J. Soc. trop. Agric.* **5** no. 3 pp. 308–314, 2 figs., 13 refs. Taihoku, Formosa, October 1933.

In these continued experiments [*cf. R.A.E.*, A **21** 211] at Taihoku, it was found that the freezing point of the body fluid in larvae of the rice borer, *Schoenobius bipunctifer*, Wlk. (*incertellus*, Wlk.) grows gradually lower from January to April, and at the same time the water content of the body is also reduced. The freezing point is higher in the pupa than in the last larval instar.

Koidsumi (K.). **Experimental Studies on the Influence of Low Temperatures upon the Development of Fruit-flies. Fourth Report. A Comparison of the Cold-hardiness of** *Chaetodacus cucurbitae* **Coq. at various Stages of its Life Cycle.** [*In Japanese.*]—*J. Soc. trop. Agric.* **5** no. 3 pp. 317–331. Taihoku, Formosa, October 1933.

From these experiments [*cf. R.A.E.*, A **22** 113, etc.] at Taihoku on the resistance of the egg, larva and pupa of the melon fly, *Dacus* (*Chaetodacus*) *cucurbitae*, Coq., to temperatures ranging from —6°C. to 9°C. [21·2–48·2°F.] in summer, it is concluded that resistance to cold decreases during the larval stage and increases again during the pupal stage, being highest just before adult emergence. All the immature

stages may be killed by exposure to −3°C. [26·6°F.] for 2 days, 0°C. [32°F.] for 11 days, 3°C. [37·4°F.] for 18 days or 6°C. [42·8°F.] for 40 days. Pupae within 4 days of pupation may be killed by exposure to 9°C. [48·2°F.] for 60 days, but older ones survive.

FUKUDA (K.). **Insect Pests of Sweet Potato in Formosa. Part 1. The Sweet Potato Weevil.** [*In Japanese.*]—*Rep. Govt Res. Inst. Formosa* no. 62, pp. 1–35, 1 pl. Taihoku, Formosa, December 1933.

A list is given of the 23 insects known to attack sweet potatoes in Formosa. *Cylas formicarius*, F., is very injurious, especially in southern Formosa and in Hokoto (Pescadores Islands), 48 per cent. of the tubers being sometimes attacked. The larvae feed only on sweet potato, but the adults also feed on wild species of *Ipomoea* and on *Calystegia soldanella*. There are 3–8 generations a year. The adults live from 5 to 142 days, with an average of 68·5, and there is scarcely any difference in longevity between the sexes. One female lays an average of 75·8 eggs [*cf. R.A.E.*, A **22** 238], which hatch in 5–16 days. The larvae complete their 4 instars in 16–29 days, and the pupal stage lasts 6–12 days. Fumigation with carbon bisulphide causes the tubers to decay and also injures sprouting, without entirely eliminating infestation. Crop rotation and burying the injured stalks and tubers deep in damp soil are recommended for control.

Compendium of the Control of Insects injurious to Crops in Formosa. II. Insect Pests of Cereal Crops, Sweet Potato and Beans. [*In Japanese.*]—*Publ. Govt Formosa, Bur. Ind.* no. 666, [6] 7, 144 pp., 12 col. pls., 11 figs. Taihoku, Formosa, March 1934.

In this second paper of a series [*cf. R.A.E.*, A **21** 359], 97 species of insects attacking cereals, sweet potato and beans in Formosa, are briefly described, and notes are given on their bionomics and control.

SONAN (J.). **On *Tricholyga sorbillans* Wied.** [*In Japanese.*]—*Formosan agric. Rev.* **30** no. 332 pp. 666–667. Taihoku, Formosa, July 1934.

Brief descriptions are given of all stages [*cf. R.A.E.*, A **22** 241] of *Tricholyga sorbillans*, Wied. (of which *T. bombycum*, Becher, is a synonym), which was recently found for the first time parasitising silkworms [*Bombyx mori*, L.] in Formosa, some 10 to 20 per cent. being attacked in the Taiko district in 1932.

YANAGIHARA (M.). **Studies on the Biology of *Melanotus tamsuyensis* Bates.** [*In Japanese.*]—*J. Formosan Sug. Pl. Ass.* **11** no. 8–9 pp. 417–434. Taichu, Formosa, December 1933.

The Elaterid, *Melanotus tamsuyensis*, Bates, is a very important pest of sugar-cane in Formosa, especially in the southern half of the island [*cf. R.A.E.*, A **18** 244]. The adults emerge from October to February near Heito (Takao Prefecture) and from March to May further north (Taichu Prefecture). They are active in the evening from 6 to 10 p.m., resting among the leaves during the daytime. Temperatures of over 20°C. [68°F.] are favourable to their activity, and the above difference in their seasons of emergence seems to be due to temperature. Over

8,000 were collected per acre in one field. The females oviposit in the soil near the food-plants of the larvae, which include *Miscanthus*, *Imperata* and other grasses. One female lays from 47 to 238 eggs over a period of about 20 days. The eggs hatch in 20 days on an average, and the larvae require more than 2 years for development. The latter can survive irrigation for 4 or 5 days.

TAKANO (S.). **Hymenopterous Parasites of Lepidopterous Pests of Sugar-cane in Formosa and their Bibliography.** [*In Japanese.*]—*J. Formosan Sug. Pl. Ass.* **11** no. 10 pp. 454–466. Taichu, Formosa, January 1934.

Eucosma schistaceana, Sn., is parasitised in Formosa by *Trichogrammatoidea* (*Trichogramma*) *nana*, Zhnt., *Trichogramma australicum*, Gir., *Chelonella nitobei*, Sonan, *Apanteles flavipes*, Cam., *Angitia* (*Dioctes*) *lineata*, Ishida, and *Xanthopimpla stemmator*, Thnb.; *Chilo infuscatellus*, Sn., by *Phanurus beneficiens*, Zhnt., *T. nana*, *T. australicum*, *Amyosoma* (*Bracon*) *chinensis*, Szép., *Stenobracon trifasciatus*, Szép., *Apanteles flavipes*, *Angitia lineata*, and *X. stemmator*; *Diatraea venosata*, Wlk., by *P. beneficiens*, *T. nana*, *T. australicum*, *A. flavipes*, *X. stemmator*, *Amauromorpha schoenobii*, Vier., *Mesostenus longicornis*, Ishida, and *Gambrus rufithorax*, Uchida; *Scirpophaga nivella*, F., by *P. beneficiens* var. *elongatus*, Ishida, *Elasmus* sp., *Stenobracon trifasciatus*, *X. stemmator*, *A. schoenobii*, and *M. longicornis*; and *Sesamia inferens*, Wlk., by *Amyosoma chinensis*, *Shirakia schoenobii*, Vier., *Apanteles flavipes*, *Henicospilus sakaguchii*, Mats. & Uchida, *X. stemmator*, *Nesopimpla narangae*, Ashm., and *Amauromorpha schoenobii*.

TAKANO (S.). **On the Morphology and Biology of** *Ceratovacuna lanigera* **Zehnt., and the Relation of its Outbreaks to Environmental Conditions in Formosa.** [*In Japanese.*]—*J. Formosan Sug. Pl. Ass.* **11** no. 11 pp. 481–528, 3 pls. Taichu, Formosa, February 1934.

Detailed descriptions are given of all stages of *Oregma* (*Ceratovacuna*) *lanigera*, Zhnt., a very injurious pest of sugar-cane in Formosa, where it is viviparous throughout the year, sexual forms being absent. It feeds also on *Miscanthus sinensis* and *M. japonica*. The winged forms usually appear in the dry season from October to April or May in the south of the island, but are fewer than the apterous ones, which occur throughout the year, being most abundant in October–November, and again in April–May, in which months serious damage is done. The nymphs, which are at first rather active, are gregarious, about 200 being found per sq. inch in March and April. In February, the nymphal stage of the apterae lasted 23–24 days in the greenhouse and 32 out of doors and that of the winged form 32–34 and 39–40 respectively, both undergoing four moults. The apterae reach the adult stage in 15–20 days in late summer and early autumn, and in 23–31 in winter in the greenhouse. The apterous adults, which live 23–55 days, begin to reproduce a day after the last moult, the average number of offspring being 2·33 a day, and the total ranging from 19 to 126. Temperatures of 20–23°C. [68–73·4°F.] seem to be optimum for them, those above 28°C. [82·4°F.] or below 15°C. [59°F.] being unsuitable. The winged adults live 7–11 days, one individual producing 3–18 young during life. Some varieties of sugar-cane are more attacked than others. *Polyrhachis dives*, F. Smith, is the commonest ant fostering this Aphid.

Synonycha grandis, Thnb., a single individual of which devours some 32,000 Aphids during life, is the most important enemy of *O. lanigera* and also of other Aphids on bamboo. One female lays 400–800 eggs, which hatch in 5–8 days; the larvae develop in 9–16, and the pupal stage lasts 5 or 6. The adult beetles live 2 or 3 months, but survive as long as 6 months when kept at 15°C. and supplied with cotton steeped once a week in sugar solution. This Coccinellid may be utilised for the control of the Aphids at the outbreak periods. *Scymnus* sp., *Thiallela* sp., *Syrphus aegrotus*, F., *S. confrater*, Wied., and the Neuroptera, *Chrysopa boninensis*, Okam., *Ankylopteryx octopunctata*, F., and *Eumicromus sauteri*, Peters., also prey on this Aphid, and a fungus, *Aspergillus* sp., infests it, especially in May and June. The Coccinellid, *Coelophora saucia*, Muls., which was imported into Formosa from Tonkin (Indo-China) for the control of this Aphid in 1924, has been liberated throughout the island, but has only become established in the field in Takao Prefecture. *Encarsia flavoscutellum*, Zhnt., has been imported several times from Java since 1926, but has not become established and does not promise effective control in the Island [*cf.* *R.A.E.*, A **19** 446; **20** 214].

Ijima (K.). **Some Observations on the Biology of *Trichogramma australicum* Girault.** [*In Japanese.*]—*Kontyû* **8** no. 2 pp. 74–83. Tokyo, June 1934.

In experiments with *Trichogramma australicum*, Gir., and the sugarcane borer, *Eucosma* (*Laspeyresia*) *schistaceana*, Sn., in Formosa, the female parasites oviposited in eggs of the Tortricid of any age. As many as 6 eggs were sometimes laid in one host egg, but the resulting adults were smaller and less vigorous and survived for shorter periods. Of the total number of host eggs parasitised by an individual female, over 17 per cent. were attacked by it on the day of emergence, but the percentage was much less on the following days. Eggs not previously parasitised were attacked in preference, but not exclusively. Unfertilised eggs were parasitised less readily than others, and development in them was retarded, the adults that emerged living shorter periods. Unfertilised females produced males only. The females sometimes fed on the juices at the oviposition punctures. On an average, 65 per cent. of the parasites reached the adult stage, mortality being higher in the males.

Yuasa (H.). **Notes on Japanese Chrysomelidae. III.** [*In Japanese.*] —*Kontyû* **8** no. 8 pp. 107–109. Tokyo, June 1934.

This continued paper [*cf.* *R.A.E.*, A **16** 53; **17** 546] deals with records of Eumolpids in Japan. The adults of *Xanthonia placida*, Baly, feed on young mulberry buds, those of *Nodostoma* (*Basilepta*) *fulvipes*, Motsch., on fig leaves, and those of *Paria variabilis*, Baly, on the leaves of pear, plum, apple and peach. The larvae of the last-named feed on the roots of plum.

Nezu (R.), Sakamoto (I.) & Sonoyama (T.). **Studies on *Luperodes femoralis* Motsch.** [*In Japanese.*]—219 pp., 12 pls. Shimane agric. Exp. Sta., Shimane, Japan, March 1933.

The Galerucid, *Rhaphidopalpa* (*Luperodes*) *femoralis*, Motsch., all stages of which are described, is a serious pest of cucurbits in Japan

[*cf. R.A.E.*, A **18** 591]. It has one brood a year. The overwintered adults begin to be active from the middle of May, feeding on the leaves of cucurbits and a wide range of other food-plants, especially radish, *Brassica*, aster, bean, etc. They are more injurious to crops near hills or houses than in open fields. They are active on warm, fine days, dropping to the ground when disturbed, and usually spend the night resting on plants other than cucurbits. The females slightly outnumber the males, and pairing takes place 5–11 days after emergence. Adults lived 45 days without food, but those that had fed for 3 days after emergence lived only a further 13 days without food. They begin to hibernate in sheltered places from the middle of October, when the temperature falls below 18°C. [64·4°F.], and begin to be active in spring, when it reaches 17°C. [62·6°F.]. The eggs are laid on the ground near the cucurbits from June to August, especially from late June to mid-July, over a period averaging 42 days. A single female produces 300–600 eggs, or sometimes as many as 1,074, during life, usually 10–20 in each batch. In an experiment, one female laid an average of 757 eggs on clayey soil, and 393 on sandy soil. Some 80 per cent. of the eggs hatched after being submerged in water for 24–48 hours, and 33 per cent. after 3 days, but they are less resistant to dryness. The egg stage lasts some 11 days, and hatching usually takes place before noon. The larvae feed on the roots of cucurbits and complete their growth in 15 days, moulting three times, but development is more rapid when they are fed on the leaves and stalks. They fed on various other plants in captivity, but can only develop on cucurbits. Sandy soil appears to be unfavourable to their development. The prepupal stage lasts about a week, and pupation takes place in the soil, the adults emerging a week later.

Planting the cucurbits among wheat and covering the young plants with paper or nets prevent injury, and oviposition may be prevented by covering the ground with rice stalks and scattering tobacco dust round the plants. Bordeaux mixture with lead arsenate [*cf.* **22** 18] is most effective against the adults, and derris and pyrethrum are also effective, but not nicotine. Derris sprays are very effective against the larvae.

Tanabe (C.), Sekiya (I.) & Kumagaya (M.). **Biology and Control of *Epilachna niponica*, Motsch.** [*In Japanese.*]—*Rep. Nagano agric. Exp. Sta.* no. 5, 71 pp., 5 pls. Nagano, Japan, March 1934.

Further notes are given on the bionomics of *Epilachna niponica*, Lew., in Japan [*cf. R.A.E.*, A **20** 114, 495]. A female lays 645·2 eggs in 25·6 masses on an average when fed on potato plants, but fewer on tomato or egg-plant [*Solanum melongena*]. Eggs are laid every day at the beginning, but at intervals of 5–10 days at the end, of the egg-laying period, which lasts some 40 days, densely growing plants being preferred. About 90 per cent. of the eggs laid in June hatched, and about 90 per cent. of the larvae reached the adult stage. Later in the season, fewer eggs hatched, and larvae that hatched towards the end of July died, apparently owing to the heat. The optimum temperature for this Coccinellid seems to be about 23°C. [73·4°F.], 28°C. [82·4°F.] being very unfavourable. The eggs hatch in 3–12 days, and the larvae complete their growth in 13–30 days when fed on potato, but much more slowly on tomato or egg-plant. The pupal stage lasts 5–14 days. The adults begin to feed some 30 hours after emergence and become dormant from mid-August to the end of September on the leaves of

various plants sheltered from the sun, hibernating from late October. A partial second generation may occur. A spray of lead arsenate in Bordeaux mixture is the most effective for control.

MORIYAMA (T.). **On the Larva of *Arctornis xanthocampa* Dyar and the poisonous Hairs on the Moth.** [*In Japanese.*]—*Ent. World* **2** no. 9 pp. 270–279. Tokyo, June 1934.

Morphological notes are given on the urticating hairs of *Arctornis chrysorrhoea* var. *xanthocampa*, Dyar, which first appear in the second larval instar. Silkworms [*Bombyx mori*, L.] begin to show a few patches on the body skin some 20 minutes after being in contact with them [*cf. R.A.E.*, A **17** 567]. The poison is retained for a long period in hairs removed from the larvae, decreasing in 80 days and disappearing in 500 days when kept indoors, but in a month and 200 days, respectively, out of doors. When the larvae pupate, the hairs are deposited on the inside of the cocoons, from which they become attached to the legs of the moths when they emerge, some 20 adhering to each pulvillus.

MURATA (J.) & MISHIMA (R.). **Control of *Ceroplastes rubens* Mask. on *Diospyros kaki*.** [*In Japanese.*]—*Agric. & Hort.* **9** nos. 5–6 pp. 1135–1144, 1325–1330. Tokyo, May–June 1934.

Ceroplastes rubens, Mask., which was introduced into Japan about 1897, is now distributed over the southern half of Honshu and was first noticed in 1926 in Nara Prefecture. At present it is known to attack 125 plants belonging to 47 families in Japan, of which *Ilex oldhami* is a very favourite one in Nara Prefecture. *Clethra barbinervis* and *Quinaria tricuspidata* are recorded for the first time as foodplants. This Coccid feeds on the young shoots of persimmon (*Diospyros kaki*) in the Prefecture, causing very serious damage. Pruning the infested twigs in winter, fumigating the seedlings with hydrocyanic acid gas, and spraying resin wash in winter and during the hatching period (from mid-July to early August) are recommended for control.

FUJITA (K.). **The Question of the Injuriousness of Honey Bees to Citrus Fruit.** [*In Japanese.*]—*Agric. & Hort.* **9** nos. 6–7 pp. 1413–1414, 1616–1618. Tokyo, June–July 1934.

In Japan, apiculture has become established in recent years in some districts of *Citrus* cultivation. In an experiment to determine whether the bees injure the fruit, a colony was placed under a net covering two *Citrus* trees. The bees sometimes opened the flower-buds to take honey, but this is not injurious and hastens the flowering and stimulates the setting of fruit. The surface of the young fruits is sometimes slightly injured, but the wounds disappear during growth.

LEVER (R. J. A. W.). **Notes on some Hymenopterous Parasites of Coconut Insects.**—*Brit. Solomon Is. agric. Gaz.* **2** no. 1 pp. 2–3, 4 figs. Tulagi, January 1934. [Recd. July 1934.]

Brief descriptions are given of the appearance and habits of both sexes of *Apanteles tirathabae*, Wlkn., which parasitises the larvae of *Tirathaba rufivena*, Wlk., and of *Anastatus axiagasti*, Ferrière, and *Microphanurus painei*, Ferrière, which (in one island) parasitise about 64 per cent. of the eggs of *Axiagastus cambelli*, Dist., on coconut in the Solomon Islands [*cf. R.A.E.*, A **21** 360, 625].

Pagden (H. T.). **The commercial Possibilities of some local Plants as Insecticides.**—*Brit. Solomon Is. agric. Gaz.* **2** no. 1 pp. 6–7, 5 refs. Tulagi, January 1934. [Recd. July 1934.]

Plants used as fish poisons and that might be of value as insecticides in the Solomon Islands include the seeds of a myrtaceous tree, *Barringtonia* sp., the leaves and stems of a vine and a species of *Derris*. The latter appears to be closely related to the Malayan form, *D. malaccensis* [*cf. R.A.E.*, A **22** 483] and seems to be present on most of the islands of the group. It appears to have a fairly high rotenone content, and a 0·05 per cent. preparation of the root killed fish in 5 minutes.

P[agden] (H. T.). **Notes on the Destruction of some Household Pests.** —*Brit. Solomon Is. agric. Gaz.* **2** no. 1 p. 9. Tulagi, January 1934. [Recd. July 1934.]

Recommendations for the control of household pests include a mixture of 1 pint methylated spirits, 1 pint shellac solution (or preferably Chinese varnish), 1 oz. mercury bichloride and 1 oz. white crystals of phenol, which should be applied rapidly by means of a fairly wide flat brush to the covers and backs and the inside edges of books to protect them against cockroaches and other injurious insects. A single application remains effective for about two years.

Chamberlain (E. E.). **Tomato-mosaic. Its Appearance, Cause and preventive Treatment.**—*N. Z. J. Agric.* **48** no. 6 pp. 344–351, 5 figs., 16 refs. Wellington, N.Z., 20th June 1934.

In this account of mosaic disease of tomato, which sometimes causes serious losses in New Zealand, especially in greenhouses, it is stated that *Macrosiphum solanifolii*, Ashm. (*gei*, auct.) and *Myzus solani*, Kalt. (*pseudosolani*, Theo.) do not appear to be very important in its dissemination, as tomatos growing next to others infected with both the mild and severe types did not contract the disease, although the Aphids were numerous on all plants early in the season.

Both forms of the disease were also transmitted to tobacco, which showed a high percentage of infection in the field, *Physalis peruviana* and *Solanum nigrum*.

Bennett (C. W.). **Plant-tissue Relations of the Sugar-beet Curly-top Virus.**—*J. agric. Res.* **48** no. 8 pp. 665–701, 10 figs., 27 refs., Washington, D.C., 15th April 1934. [Recd. July 1934.]

During experiments in the United States on the inoculation of sugar-beet plants with curly-top virus, observations were made on the feeding of *Eutettix tenella*, Baker, the vector of the disease. This Jassid feeds on the veins, the mouth-parts usually penetrating to the phloem region, and secretes a sheath of apparently gelatinous material round the stylets; this sheath may close all the cells that are external to the phloem and protect the virus as it is passed into or drawn out from it. There was a high mortality amongst leafhoppers fed on parenchymatous tissue, as compared with those fed on tissue containing vascular elements. Equal numbers of leafhoppers fed on the two kinds of tissue from diseased seedlings and then caged in groups of five on healthy seedlings infected 10 and 210 respectively out of 428. These results supplement other evidence that the virus is concentrated in the phloem and is relatively scarce in the parenchyma, which it probably enters

with the escape of the phloem content in diseased plants into the intercellular spaces.

The virus was found to travel 6 inches in 6 minutes in sugar-beet, but not more than 24 inches in 48 hours in tobacco.

PETTIT (R. H.). **Reports on the Entomology Section for the Years ended June 30th, 1931–1933.**—*Rep. Mich. St. Bd Agric. 1931*, reprint 22 pp., 17 figs.; *1932*, reprint 25 pp., 29 figs.; *1933*, reprint 12 pp., 12 figs. East Lansing, Mich., 1931–33. [Recd. 20th July 1934.]

Among the insect pests recorded during the year ending June 1931 (many of which have been already noticed), those that are of particular interest or are recorded for the first time from Michigan include the following. The first severe outbreak of *Coleophora malivorella*, Riley, occurred on apple in April; the larvae damaged the buds and unfolding leaves and sometimes attacked the small fruit. *Tortrix* (*Archips*) *argyrospila*, Wlk., an important pest of apple, was reported as attacking to a less degree cherry, quince, pear and raspberry, and *Argyroploce* (*Badebecia*) *urticana*, Hb., caused severe injury to the tips of the new growth on raspberry over a small area. *Phyllocoptes cornutus*, Banks, was more prevalent on peach than for the last ten years. *Phorbia* (*Hylemyia*) *cilicrura*, Rond., was abundant during early summer on beans, sweet maize, potatoes, spinach and cucurbits. An outbreak of *Coleophora laricella*, Hb., occurred on larch in late May.

During the year ending June 1932, *Dioryctria abietella*, Schiff., was taken on Scots pine [*Pinus sylvestris*]. *Scolytus quadrispinosus*, Say, was present in much larger numbers than previously and killed many hickory trees. An unusual outbreak of the Berytid, *Jalysus spinosus*, Say, injured the stems and fruit of tomatos in one district in September. *Macrosiphum onobrychis*, Boy. (*Illinoia pisi*, Kalt.) occurred in serious numbers on peas during summer. A number of apple trees and soft maples were injured by *Chrysobothris femorata*, F., which bored between the bark and wood of young trees and finally entered the sapwood and even the heartwood. *Phlyctaenia rubigalis*, Gn. (*ferrugalis*, auct.) migrated from greenhouses to celery fields, as many as twenty larvae being found in one plant.

During the year ending June 1933, *Ancylis comptana*, Froel., was a serious pest in strawberry plantings. Young maple trees were defoliated by *Dicerca divaricata*, Say, in June. The Membracid, *Glossonotus crataegi*, Fitch, was of considerable importance on apple in one orchard. A severe infestation of willow by *Cryptorrhynchus lapathi*, L., was discovered. Owing to prevailing mild weather in the previous winter, *Heliothis obsoleta*, F., was particularly injurious to maize during the season. *Aphis* (*Rhopalosiphum*) *pseudobrassicae*, Davis, was common on cruciferous crops.

TUCKER (R. P.). **Some Notes on the Lead Arsenates.**—*Mon. Bull. Dep. Agric. Calif.* **23** no. 2–6 pp. 141–145, 2 refs. Sacramento, Calif., 1934.

Acid lead arsenate scorches foliage in the coastal fog belts of California, but can be used safely in other parts of the State. Basic lead arsenate is therefore used as an insecticide along the coast. From the author's experiments, it is concluded that scorching by acid lead arsenate may be due to its reaction with sodium chloride carried from

the sea by winds. The two salts react with the moisture furnished by the fogs, producing a basic chloro-arsenate with consequent release in soluble form of approximately 35 per cent. of the total arsenic in the original compound. Damage to susceptible foliage is possible if water with appreciable quantities of salt (sodium chloride) is used in spraying with acid lead arsenate [*cf. R.A.E.*, A **10** 288 ; **11** 6].

Wishart (G.) & Van Steenburgh (W. E.). **A Contribution to the Technique for Propagation of** *Chelonus annulipes* **Wesm. ; an imported Parasite of the European Corn Borer.**—*Canad. Ent.* **66** no. 6 pp. 121–125, 1 pl., 3 refs. Orillia, June 1934.

During work in Canada on rearing *Chelonus annulipes*, Wesm., an introduced parasite of *Pyrausta nubilalis*, Hb., it became apparent that the age of the host egg influenced the percentage of successful parasitism. The life-history of this Braconid is briefly described [*cf. R.A.E.*, A **20** 478]. In 1932, host eggs approximately 60 hours old gave 36·0 per cent. parasitism, whereas those up to 24 hours or from 84 to 90 hours old (*i.e.*, just about to hatch) gave only 26·6 and 11·4 per cent. respectively. Similar results were obtained in 1933 ; with 60-hour eggs the highest parasitism was 95·9 per cent. and the average of 10 lots was 83·0 per cent., whereas with 24-hour eggs the corresponding percentages were 44·4 and 41·9. Microscopic studies showed that, when the egg is laid in the yolk, survival is only possible if it is laid early enough to permit the Braconid larva (which hatches in 24–26 hours at 80° F.) to pass between the lateral folds of the embryo before the dorsal closure is complete (*i.e.*, within 60 hours of the deposition of the host egg). The percentage of survival appears to diminish as the period between parasite hatching and dorsal closure becomes shorter. If the egg is laid after segmentation is apparent in the host (25–35 hours after deposition) survival depends on its being placed in a suitable position in the embryo, and the percentage increases with the age of the host ; eggs laid after the rotation of the latter, which immediately follows the dorsal closure, generally develop normally. In host larvae dissected after hatching, the parasite larvae were always found in the region of the malpighian tubes.

Papers noticed by Title only.

DeLong (D. M.) & Davidson (R. H.). **A new Species of** *Typhlocyba* [*prini*, sp. n.] (**Homoptera Cicadellidae**) **injurious to Prune in the Pacific Northwest** [Idaho and Washington].—*Ohio J. Sci.* **34** no. 3 pp. 161–162, 3 figs. Columbus, Ohio, May 1934.

Mills (H. B.). **A Monograph of the Collembola of Iowa.**—*Monogr. Div. industr. Sci. Iowa St. Coll.* no. 3, xi+143 pp., 189 figs., 6 pp. refs. Ames, Iowa, Coll. Press, Iowa St. Coll., 1934. Price $2·25.

Gillette (C. P.) & Palmer (M. A.). **The Aphidae of Colorado. Part III.**—*Ann. ent. Soc. Amer.* **27** no. 2 pp. 133–255, 125 figs., Columbus, Ohio, June 1934. [*Cf. R.A.E.*, A **20** 192, 591.]

Hodson (A. C.). **The Origin and Differentiation of the Sex Organs of** *Tribolium confusum* **Duval.**—*Ann. ent. Soc. Amer.* **27** no. 2 pp. 278–288, 2 pls., 47 refs. Columbus, Ohio, June 1934.

Thorpe (W. H.). **Observations on the Structure, Biology and Systematic Position of** *Pantophthalmus tabaninus* **Thunb. (Diptera Pantophthalmidae).**—*Trans. R. ent. Soc. Lond.* **82** pt. 1 pp. 5–22, 20 figs., 18 refs. London, 30th June 1934.

Ronna (E.). **Catalogo dos insétos até hoje encontrados nas plantas do Rio Grande do Sul.** [Catalogue of Insects hitherto found on Plants in the State of Rio Grande do Sul (Brazil).]—*Egatea* **19** no. 3 pp. 115–120. Porto Alegre, 1934. [Continuation, see *R.A.E.*, A **22** 424.]

Hori (M.). **A List of the Insect Pests of Agricultural Plants in Southern Sakhalin** [76 spp. with their food-plants]. [*In Japanese.*]—*Bull. Saghalien centr. Exp. Sta.* Ser. 1 (Agric.) no. 2, 54 pp. Konuma, Sakhalin, March 1934.

Matsuda (M.). **Studies on** *Chrysomphalus aonidum* **L. VII.** [*C. ficus*, Ashm., on *Pasania edulis* in Japan.] [*In Japanese.*]—*J. Plant Prot.* **21** no. 5 pp. 319–327. Tokyo, May 1934. [*Cf. R.A.E.*, A **19** 417; **20** 379.]

Murayama (J.). **Notes on the Ipidae (Coleoptera) from Kiushu** [descriptions of 7 new species of Scolytids and new records for described species].—*Annot. zool. jap.* **14** no. 3 pp. 287–300. Tokyo, 25th April 1934.

Eder (H.). **Ipidologische Notizen aus der Umgegend von Słonim.** [Records of 47 Species of Scolytids from the Neighbourhood of Żyrowice, north-eastern Poland. (*In Polish.*)]—*Polsk. Pismo ent.* **12** (1933) pp. 73–80. Lwów, July 1934. (With a Summary in German.)

Kuntze (R.). **Beitrag zur mikroskopischen Anatomie der Ichneumoniden-Larven.**—*Polsk. Pismo ent.* **12** (1933) pp. 81–114, 7 pls., 31 refs. Lwów, July 1934.

Séguy (E.). **Un Anthomyide nouveau parasite des Iris, et note sur les Diptères qui vivent aux dépens des Iridées.** [*Hylemyia servadeii*, sp. n., from *Iris germanica* in Italy.]—*Boll. Lab. Ent. Bologna* **6** pp. 28–32, 2 figs. Bologna, 14th June 1933. [*Cf. R.A.E.*, A **22** 164, 365.] [Recd. July 1934.]

Metalnikov, jr. (S. S.). **Action des rayons solaires sur les spores de bactéries pathogènes pour les insectes.**—*Ann. Inst. Pasteur* **53** no. 1 pp. 93–99, 3 refs. Paris, July 1934. [*Cf. R.A.E.*, A **21** 364.]

Schwartz (W.). **Untersuchungen über die Symbiose von Tieren mit Pilzen und Bakterien. ii. Mitteilung: Neue Untersuchungen über die Pilzsymbiose der Schildläuse (Lecaniinen).** [Investigations on the Symbiosis of Animals with Fungi and Bacteria. II. New Investigations on the Symbiotic Fungi of Lecaniine Coccids.]—*Arch. Mikrobiol.* **3** no. 4 pp. 453–472, 10 figs., 14 refs. Berlin, 6th August 1932. [*Cf. R.A.E.*, A **13** 3.]

Balachowsky (A.). **Contribution à l'étude des Coccides de France. (19e note). Deux espèces nouvelles pour la faune de France récoltées dans la région parisienne.**—*Bull. Soc. ent. Fr.* **39** no. 9 pp. 130–131, 2 refs. Paris, 1934.

Goux (L.). **Notes sur les Coccides (Hem.) de la France. (9e note). Contribution à l'étude du genre** *Helicoccus* **avec description de deux espèces nouvelles.**—*Bull. Soc. ent. Fr.* **39** no. 11 pp. 164–171, 14 figs. Paris, 1934.

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ANNALS OF THE QUEENSLAND MUSEUM (BRISBANE). Nos. 1, 5 and 6 (1891–).

ANNUAIRE ET MÉMOIRES DU COMITÉ D'ETUDES HISTORIQUES ET SCIENTIFIQUES DE L'AFRIQUE OCCIDENTALE FRANÇAISE (GORÉE) : Vols. I-II (1916–17).

AGRICULTURAL JOURNAL, DEPARTMENT OF AGRICULTURE, BRITISH COLUMBIA (VICTORIA) : Vol. I (1916). Nos. 1 and 2.

AGRICULTURAL NEWS (BARBADOS) : Nos. 1, 25, 26, 34, 66 (1902–04).

ARCHIVES DE L'INSTITUT PASTEUR DE TUNIS :
1906–09 ; 1910, fasc. i–iii ; 1911, fasc. iii–iv.

ARCHIV FÜR SCHIFFS- UND TROPEN-HYGIENE (LEIPZIG) :
Bd. XVII (1913). Hefte, 9, 13 & 14.

ARQUIVOS DO INSTITUTO BACTERIOLOGICO CAMARA PESTANA (LISBON) :
Vols. I–II (1906–10). Vol. III (1911–12) No. 1.

THE BEE WORLD (BENSON, OXON) : Vols. I–II (1919–21).

BIOLOGICAL BULLETIN OF THE MARINE BIOLOGICAL LABORATORY (WOODS HOLE, MASS.) :
Vols. I–II (1899–1901) ; XXIII (1912) ; XXIV (1912) No. 2 ; XXV (1913) Nos. 5–6 ; XXVI (1914) Nos. 1–2 ; XXVII (1914) No. 4 ; XXVIII (1915) No. 1 ; XXIX (1915) No. 5 ; XXX (1916) Nos. 2–3 ; XXXI (1916) Nos. 4 & 6 ; XXXII–XXXIII (1917) ; XXXIV (1918) Nos. 1–4, & 6 ; XXXV (1918) ; XXXVI (1919) Nos. 2–3 ; XXXVII (1919) Nos. 4 & 6 ; XXXVIII (1920) Nos. 1, 2, 5 & 6 ; XXXIX (1920) Nos. 4–6 ; XL (1921) Nos. 1–4, & 6 ; XLI (1921) Nos. 2 & 3 ; XLII (1922) Nos. 1–3.

BOLETIN DE LA DIRECCION DE ESTUDIOS BIOLOGICAS (MEXICO) :
TOMOS I–II (1924–25).

BULLETIN DU COMITÉ D'ÉTUDES HISTORIQUES ET SCIENTIFIQUES DE L'AFRIQUE OCCIDENTALE FRANÇAISE (PARIS) : Année 1919, No. 1.

BULLETIN AGRICOLE DE L'ALGÉRIE—TUNISIE—MAROC (ALGIERS).
Année XX (1914). Nos. 7–9, 12–14 and Title-page.

CALIFORNIA AGRICULTURAL EXPERIMENT STATION (BERKELEY, CAL.) :
Circulars 14 and 42 (1905–09).

CANADA : DEPARTMENT OF AGRICULTURE : EXPERIMENTAL FARMS :
Fletcher (J.). Reports of the Entomologist and Botanist for the Years 1886 and 1888. (Ottawa, 1887–89.)

CHACARAS E QUINTAES (SÃO PAULO) : Indices to Vols. X, XI, XII and XIV.

COMPTES RENDUS DES SÉANCES DE L'ACADÉMIE D'AGRICULTURE DE FRANCE (PARIS) : Tome VIII (1922) No. 5.

EGATEA, REVISTA DA ESCOLA DE ENGENHARIA DE PORTO ALEGRE, BRAZIL :
Vols. I–VI (1916–21) ; VII (1922) Nos. 1–5 ; VIII (1923) Nos. 2–5 ; IX (1924) Nos. 1, 4–6.

ENTOMOLOGICA AMERICANA (BROOKLYN, N.Y.) :
Vol. IV (1888) Title-page. Vol. V (1889), Nos. 6 & 8.

ENTOMOLOGISCHE LITTERATURBLÄTTER (BERLIN) : 6 Jahrg. (1906). Nos. 2 & 10.

EXPERIMENT STATION RECORD (WASHINGTON, D.C.) : Vols. I–IV (1889–94).

GEORGIA STATE BOARD OF ENTOMOLOGY (ATLANTA) :
Bulletin : 2, 6, 22 and 28. Circular : 1 to 3, 12, 15 to 18 and 20.

GRASSI (B.) et al. Contributo alla conoscenza delle Filloserine ed in particolare della Fillossera della Vite. (Rome, 1912.)

INDIA : FOREST RESEARCH INSTITUTE (DEHRA DUN).
Indian Forest Records : Vol. I, pts. i and iii.
Forest Bulletin (Old Series) : Nos. 1–3.
Forest Leaflet (Zoology Series) : Nos. 1–2.

INDIAN MEDICAL GAZETTE (CALCUTTA) :
Vol. L (1915) No. 10 ; LI (1916) Nos. 1–7, 10 ; LII (1917) No. 7 and title-page & index ; LIII (1918) ; and LIV (1919) No. 2.

INDIANA : Third Annual Report of the State Entomologist, 1909–10.

JOURNAL OF THE BOARD OF AGRICULTURE OF BRITISH GUIANA (DEMERARA) :
Vol. III (1909–10) No. 1. Title pp. and Indices to Vols. I–II.

JOURNAL OF THE SOUTH-EASTERN AGRICULTURAL COLLEGE (WYE, KENT) :
Nos. 1–6, 8, 10–13, 17–21 (1895–1912).

KENTUCKY AGRICULTURAL EXPERIMENT STATION (LEXINGTON, KY.) :
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THE KENYA AND EAST AFRICAN MEDICAL JOURNAL (NAIROBI): Vol. II, Nos. 2–3 (1925).
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NEW JERSEY STATE DEPARTMENT OF AGRICULTURE (TRENTON, N. J.): Bulletin 2; Circular: 2, 12, 29 (1917–19).
NEW YORK STATE MUSEUM (ALBANY, N.Y.): Bulletin: 26 & 57 (1899–1902).
ONTARIO ENTOMOLOGICAL SOCIETY REPORT (TORONTO): 9th (1878).
ORMEROD (E. A.). OBSERVATIONS OF INJURIOUS INSECTS AND COMMON FARM PESTS DURING THE YEARS 1877 & 1878. (London, 1878–79.)
PARASITOLOGY. Vol. VI, Nos. 1–3. Vol. IX, No. 1. (Cambridge, 1913–16).
PHILIPPINE AGRICULTURIST AND FORESTER (MANILA):
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PHILIPPINE JOURNAL OF SCIENCE (MANILA): Vol. I (1906). No. 10.
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Journal, Vol. I (1917). No. 3.
RECORDS OF THE EGYPTIAN GOVERNMENT SCHOOL OF MEDICINE (CAIRO): Vol. I.
REVISTA DE AGRICULTURA DE PUERTO RICO (SAN JUAN):
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REVISTA CHILENA DE HISTORIA NATURAL (SANTIAGO):
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REVISTA DE VETERINARIA E ZOOTECHNIA (RIO DE JANEIRO):
Annos I–II (1911–12). Anno III (1913). Nos. 1 to 3, and 5.
LA REVUE DE PHYTOPATHOLOGIE APPLIQUÉE (PARIS): Tome I. Nos. 22–23 (April-May, 1914).
RHODESIA AGRICULTURAL JOURNAL (SALISBURY):
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SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY:
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TENNESSEE AGRICULTURAL EXPERIMENT STATION (KNOXVILLE):
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TENNESSEE STATE BOARD OF ENTOMOLOGY (KNOXVILLE):
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TEYSMANNIA (BATAVIA): 32ste Jaarg. (1921). 10e Afl.
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TIJDSCHRIFT OVER PLANTENZIEKTEN (WAGENINGEN)
Jaarg. I (1895) and XVI–XVII (1910–11).
TIMEHRI: THE JOURNAL OF THE ROYAL AGRICULTURAL AND COMMERCIAL SOCIETY OF BRITISH GUIANA (DEMERARA):
Third Series, Vols. I, Nos. 1–2; II, No. 2 to end; III, No. 2 to end; IV–V (1911, 1913–18).
THE TROPICAL AGRICULTURIST (COLOMBO): Vol. XL. No. 4, April 1913.

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